Bulletin No. 336

DEPARTMENT OF THE INTERIOR

UNITED STATES GEOLOGICAL SURVEY

GEORGE OTIS SMITH, DIRECTOR

WASHING AND COKING TESTS OF COAL AND CUPOLA TESTS OF COKE

CONDUCTED BY THE

UNITED STATES FUEL-TESTING PLANT AT ST. LOUIS, MO.

JANUARY 1, 1905, TO JUNE 30, 1907

BY

RICHARD MOLDENKE, A. W. BELDEN
AND G. R. DELAMATER

WITH INTRODUCTION BY

J. A. HOLMES

IN CHARGE OF TECHNOLOGIC BRANCH

WASHINGTON
GOVERNMENT PRINTING OFFICE
1908

CONTENTS.

ABBREVIATIONS.

In describing fuels, especially as to size, use is made of the following abbreviations:

e. = egg.
f. c. = finely crushed.
f. scr. = finely screened.
l. = lump.
n. = nut.
p. = pea.
r. o. m. = run of mine.
s. = slack.
sc. = screenings.
std. = standard.
thr. = through.
w. = washed.
″ = inch or inches.

WASHING AND COKING TESTS OF COAL AND CUPOLA TESTS OF COKE CONDUCTED BY THE UNITED STATES FUEL-TESTING PLANT AT ST. LOUIS, JANUARY 1, 1905, TO JUNE 30, 1907.

By Richard Moldenke, A. W. Belden, and G. R. Delamater.

INTRODUCTION.

By Joseph A. Holmes.

The tests of washing and coking coals and of the behavior of the resulting coke in cupola practice, as reported herein, were made during the fiscal years 1905 and 1906 at the St. Louis fuel-testing laboratory of the United States Geological Survey. These tests were carried on in connection with similar investigations of the steaming and gas-producing qualities of the same coals and of the possibility of improving such coals by briquetting. This work was a part of the general inquiry concerning the most economical manner of utilizing each type of coal tested.

Many coals as received from the mine were found to be too high in ash, in sulphur, or in phosphorus to make satisfactory metallurgical coke without prior treatment, and some coals possessed better coking qualities than others. It was found that the washing of some coals so reduced the percentage of ash and sulphur as to make available for the production of coke a coal which otherwise would have had no value for this purpose. In the following pages are reported the details of the washing of coal, the production of coke therefrom, and the behavior of the coke in the cupola when utilized for the production of castings, the results of each test being tabulated in full. A study of these tables indicates many important facts as to the behavior and treatment of the coals mined in the various portions of the United States when prepared as metallurgical coke.

The washing tests of 1905 were not as satisfactory as the later tests because of inadequate storage facilities and the lack of certain equipment, but the latter was added in time for the tests of 1906. An

important result of the washing tests is shown in the percentage of ash and sulphur actually removed. The reduction of these impurities by washing, of course, increases the percentages of fixed carbon and volatile matter over the amounts present in raw coal. These facts, the number of washings, and the methods of washing, are recorded, thus furnishing valuable data as a guide to the treatment necessary to render each coal tested most suitable for coking. Altogether there were 101 regular washing tests and 12 special tests.

The results of these tests show an increase in moisture of 10 to 30 per cent, a reduction in ash in the 1905 tests of 15 to 50 per cent and in the 1906 tests of 20 to 60 per cent, and a reduction in sulphur in the 1905 tests of 10 to 40 per cent and in the 1906 tests of 10 to 50 per cent. A few examples of the total amount of reduction may be mentioned. A raw coal containing 5.05 per cent of sulphur contained after washing 2.47 per cent, a total removal of 55 per cent. Proportionate reductions in sulphur were made in coals containing lesser amounts. The ash in a raw coal containing 42.56 per cent was reduced by washing to 29.67 per cent, a total removal of 65 per cent. In a similar manner ash in a raw coal containing 15.72 per cent was reduced to 10.16 per cent, a total removal of 41 per cent; and in a coal containing 9.81 per cent to 5.38 per cent, a total removal of 59 per cent. It is evident that coals which are in the raw state utterly unfit for steaming purposes can be made fairly good steaming coals by washing, and that coals unsuited for coking can be made available in the same way.

It is proposed to conduct during the next fiscal year washing tests with much improved apparatus at the fuel-testing plant recently established at Denver, Colo., where experiments in washing and coking will be made on the coals mined in the Rocky Mountain region, with a view to determining what can be done to make them available for the production of metallurgical coke.

The coking tests were made in ovens of the regular beehive pattern, two of standard size 7 feet high, and one of standard diameter 6 feet 4 inches high. Samples of coke were taken from five different parts of the oven in practically the same location for each test, so as to give a standard method of comparison for each coke. The present report covers 192 tests, made on 100 coals, the samples having been collected from 17 States and 1 Territory. One hundred of these tests were made on raw coal, 82 on washed coal, and 10 under miscellaneous conditions. In some of these tests it was found that the addition of pitch produced coke from coal which when tested raw gave either no coke or coke of an inferior quality. In other tests the addition of pitch did not improve the quality of the coke. The tabulated results of the coking tests should be studied in the light of the description of the resulting coke which accompanies the tables. The physical tests

to determine the compressive strength of the coke—or, in other words, the height of the furnace burden which the coke will support—showed only the worthlessness of such determinations. The compressive strength of a given coke made with the same coal ranged from about 700 pounds ultimate strength per square inch to over 2,000 pounds. As a coke with compressive strength of 48 pounds will support the burden of any modern furnace, it is evident that this test is of little or no practical value, especially as the burden borne by the coke may be greatly modified by the action of heat, by attrition, and by other factors. The inquiries seem to indicate that the yield of coke is increased and the proportion of breeze reduced by preliminary crushing. Further experiments are necessary to verify these determinations, as well as to indicate the limit of fineness of such crushing. Fine crushing appears to increase the strength of the coke, which is apparently influenced also by the amount and distribution of ash.

More complete coking tests will be carried on with a view to procuring more conclusive data along the lines above indicated, also with a view to determining more accurately the loss of sulphur from coal to coke, which varies with the coals and the method of treatment. These coking tests are being continued at the new plant at Denver on beehive ovens with two heights of crown, in order to determine the treatment necessary to produce good metallurgical coke from the coals mined in the Rocky Mountain region.

The great need of the immediate future in connection with coking experiments is the conduct of such tests in by-product ovens, and it is hoped that funds may soon be had which will permit the erection and operation of such ovens.

The cupola tests of coke in 1905 and 1906 were carried on along lines fully described in Professional Paper No. 48. The results as set forth in the following tables give the details of 170 cupola tests. The data concerning record of melt, taken in connection with the indications of the source of the coals and the analyses of the corresponding coke, furnish interesting facts as to the melting ratio of iron to coke, the rate of melting per hour, and the amount of iron recovered. Equally interesting is the table giving the chemical effect on iron from cupola tests of cokes made from coals mined in various States. It is not contemplated that these cupola tests will be continued during the fiscal year, in view of the necessity of devoting the available funds to the study of the coking qualities of western coals.

WASHING TESTS.

By G. R. Delamater.

REPORT FOR 1905.

IMPROVEMENT IN EQUIPMENT.

The lack of adequate storage facilities and the constant demand on the weighing and conveying apparatus for delivering coal to the other sections of the fuel-testing plant, which greatly interfered with the washing tests made during 1904,[a] were again felt in 1905 and tended somewhat to vitiate the results, although much improvement was made in the equipment.

In order to eliminate these difficulties, important changes were made during the year in the arrangement of the washer equipment. The storage capacity available during 1904 was increased from 175 tons to 350 tons. Additional "shed bins" of 150 tons aggregate capacity were provided outside the washer plant for storing coal at times when the regular washer bins were filled.

The coal was shoveled from the cars direct to the crusher or to a hopper scale. By means of a combination elevator conveyor the coal could be transferred from the hopper scale or crusher to any one of the twelve regular storage bins, or from one bin to another; or could be transferred to belt conveyors for delivering the coal to the boiler section and other divisions of the plant. The elevator conveyor referred to was relieved of a large portion of the work of handling coals for the gas-producer and boiler sections by a 30-inch Jeffrey belt conveyor, which was installed to run from the car siding to the bins of these sections for the purpose of delivering coal to them direct from the cars.

All washing tests made during 1905 were made on the Stewart jig used during 1904, at a speed of 35 revolutions per minute and 6-inch stroke. The sludge-recovery system, with the customary perforated-bucket elevators, was used in reclaiming the washed coal and refuse

[a] Compare the following U. S. Geological Survey publications: Bull. No. 261, 1905, p. 60; Prof. Paper No. 48, 1906, p. 1460.

after washing. Owing, however, to the fact that there were only two sludge tanks—one for the washed coal and one for the refuse—only one jig could be operated at a time, since if two or more jigs were operated their output would become mixed in the sludge tanks.

With the existing arrangement of the washery it was necessary to use the same water over and over again. The washed-coal sludge tank, supplied with water from the city mains, was used as a reservoir from which the water was delivered, principally beneath the screens of the jigs. A considerable amount of fine coal was thus carried over from the sludge tank. The bulk of this fine coal settled to the bottom of the jig body, where it became mixed with the refuse and was carried on to the refuse sludge tank.

All coals tested were passed through an 18 by 24 inch Cornish tooth-roll crusher, which breaks the coal down to a maximum size of about 2 inches, although, of course, a considerable proportion may be much smaller, depending on the nature of the coal.

The power for operating the plant was furnished by a 12 by 16 inch Frost steam engine, belted to a main shaft from which the jigs and other machinery of the plant were driven. The steam for this engine was received from the boiler section.

PERSONNEL.

The 1905 tests were made under the direction of John D. Wick.

REPORT FROM JANUARY 1, 1906, TO JUNE 30, 1907.

EQUIPMENT AND OPERATION.

On February 22, 1906, the washery plant was almost entirely destroyed by fire, and with it a few samples of coal that were on hand in the storage bins. The plant was immediately rebuilt, the former arrangement being followed throughout.

From January 1 to December 15, 1906, one Stewart jig was used in making all the washing tests. During December, 1906, a special jig was installed. This jig was of the center-plunger type, i. e., the plunger was directly beneath the screen, and the upstroke of the plunger caused the pulsation. The plunger had no valves, but valves were arranged in the sides of the jig body to admit the supply water on the downstroke of the plunger. Cams and springs were used in such a manner that the plunger had a slow downward and a quick upward stroke. The screen of this jig was 4 feet wide by 5 feet long and was made of strips of No. 10 wire running lengthwise of the screen frame and set one-sixteenth inch apart. The length of the stroke was adjustable up to 4 inches. The depth of the coal bed was also adjustable.

Owing to the fact that the power for operating the washer plant was furnished by a 12 by 16 inch Frost steam engine, belted to a main shaft from which the jigs and other machinery were driven, it was impossible to change the speed of the jigs. Better results could have been obtained on some coals tested had it been possible to change the speed to suit the length of stroke used.

As the only crusher available for this work was an 18 by 24 inch Cornish tooth-roll crusher, it was impossible to crush some coals down as fine as they should have been crushed. However, an adjustable-mesh bumping screen was installed in January, 1907, in such a manner that the coal was first passed over this screen, and the tailings then passed on to the crusher, while the fuel which went through the screen dropped into the bin over the jig. The product of the crusher was then elevated again to the screen, and this cycle of operation was repeated until all the coal passed through the screen.

In December, 1906, a float and sink testing equipment was installed. Before each washing test was made, samples of the raw coal, quartered down to 2 kilograms each, were tested on four different specific-gravity solutions. In this manner it was possible to make a preliminary determination of the result of a separation under varying percentages of washed coal and refuse. The coal was then washed with the jig regulated to discharge as refuse a percentage about equal to the percentage found advisable from the float and sink tests. After a washing test was made, a sample of the refuse was taken and quartered down to four samples of 2 kilograms each, and these were also tested on the specific-gravity solutions. The test showing the highest percentage of float coal and having an analysis which agreed fairly with that of the washed coal was then used in determining the percentage of "loss of good coal in the refuse." In this manner the efficiency of the test was shown.

PERSONNEL.

John D. Wick, assisted by Edward Moore, was in charge of the washing tests from January 1 to June 30, 1906; J. H. Gould from July 16 to October 12, 1906; and G. R. Delamater from November 15, 1906, to June 30, 1907.

EXPLANATION OF TABLES.

"*Percentage of reduction*" *and* "*amount actually removed.*"—The "percentage of reduction" is the comparison made of the percentages of the impurities in the raw coal and in the washed coal. It will be readily understood that if the ash alone is reduced by washing, the fixed carbon and volatile matter will form a higher percentage of the washed coal than of the raw coal. In actual practice, however, it is

impossible to make so perfect a separation that the washing process will not remove portions of some constituents other than the impurities, and therefore the percentage of each constituent in the washed coal is affected by the reduction of each of the other constituents. This is clearly indicated in test 192, on Alabama No. 6, and test 198, on Virginia No. 6. A comparison of the raw-coal and washed-coal analyses in these two tests shows that in the test on Alabama No. 6 the percentage of sulphur was the same in the washed coal as in the raw coal; and in the test on Virginia No. 6 the sulphur in the washed coal was higher than in the raw coal. It will therefore be seen that a simple comparison of the raw-coal and washed-coal analyses will not always show whether any of the sulphur in the raw coal was actually removed with the refuse in washing.

Formulas.—In order that these percentages might be determined, the following formulas were compiled and used in making up this report. It will be noted by referring to the test data (p. 15) that 10 per cent of the original sulphur in the raw coal was actually removed with the refuse in washing Alabama No. 6, and that 13 per cent was actually removed in washing Virginia No. 6:

Let X = the percentage of reduction of any constituent.

Y = the percentage of any constituent removed by washing.

M = the percentage that the amount of the constituent in the washed coal is of the raw coal.

a = the percentage that the washed coal is of the raw coal.

b = the percentage of the constituent in the washed coal.

c = the percentage of the constituent in the raw coal.

Then $X=\frac{c-b}{c}$, $M=ab$, and $Y=\frac{c-M}{c}$.

TESTS MADE.

Sixty-three domestic samples of fuel from fourteen States and Territories and two samples from Argentina were washed during the period covered by this report. The detailed results of the tests are given in the following tables.

Details of washing tests of bituminous coals in 1905.

Washing test No.	Field No. of coal.[a]	Bed.	Date of test.	Size of coal. (See p. 4.) As shipped.	Size of coal. (See p. 4.) As washed.	Amount of coal. Raw (lbs.).	Washed. Lbs.	Washed. Per cent.	Refuse. Lbs.	Refuse. Per cent
	Illinois:									
101	6	No. 6	May 15	r. o. m.	thr. 2″.	14,710	13,586	92	1,124	8
104	7 C	do	June 26	s.	s.	15,809	11,238	71	4,571	29
108	7 D	do	July 8	r. o. m.	thr. 2″.	14,000	11,790	84	2,210	16
102	9 A	do	May 22	r. o. m.	thr. 2″.	18,000	13,920	78	4,080	22
103	10	No. 7	May 26	s.	s.	14,710	12,795	87	1,915	13
106	12	No. 6	July 6	r. o. m.	thr. 2″.	18,000	15,900	88	2,100	12
107	13	No. 7	do	1½″-6″.	thr. 2″.	29,950	27,550	92	2,400	8
105	14	No. 5	June 29	l.	thr. 2″.	18,000	15,955	89	2,045	11
110	15	No. 6	July 12	l., e.	thr. 2″.	18,000	13,035	72	4,965	28
111	16	No. 7	July 28	l., e.	thr. 2″.	14,000	12,500	89	1,500	11
109	18	No. 2	July 12	l.	thr. 2″.	18,000	14,400	80	3,600	20
	Indiana:									
115	3	No. 5	Aug. 7	n., s.	thr. 1¼″.	50,000	36,000	72	14,000	28
112	4	No. 6	July 25	sc.	thr. 1¼″.	32,000	24,000	75	8,000	25
113	6	No. 4	Aug. 4	r. o. m.	thr. 2″.	24,000	19,100	80	4,900	20
114	7 A	No. 5	Aug. 7	l., e., n.	thr. 2″.	14,000	12,240	87	1,760	13
118	8	No. 7	Aug. 31	l.	thr. 2″.	16,000	15,080	94	920	6
117	9 B	do	Aug. 24	r. o. m.	thr. 2″.	18,000	15,460	86	2,540	14
116	10	No. 6	Aug. 21	l.	thr. 2″.	18,000	15,300	85	2,700	15
	Maryland:									
130	1	Lower Kittanning.	Oct. 20	r. o. m.	thr. 2″.	45,500	37,450	82	8,050	18
	Ohio:									
119	1	No. 4	Sept. 8	r. o. m.	thr. 2″.	26,900	23,750	88	3,150	12
121	2	No. 5	Sept. 13	r. o. m.	thr. 2″.	32,420	25,625	79	6,795	21
122	3	No. 6	Sept. 19	r. o. m.	thr. 2″.	47,125	34,800	74	12,325	26
125	4	No. 8	Sept. 27	over ¾″.	tnr. 2″.	29,120	26,000	89	3,120	11
133	6	do	Nov. 8	r. o. m.	thr. 2″.	24,000	20,400	85	3,600	15
138	7	No. 7	Dec. 16	over 1¼″.	thr. 2″.	16,000	14,000	88	2,000	12
137	8	No. 6	Dec. 15	r. o. m.	thr. 2″.	17,200	15,560	90	1,640	10
131	9 B	No. 4	Oct. 25	n., s.	thr. 2″.	46,530	37,830	81	8,700	19
	Pennsylvania:									
120	5	Pittsburg	Sept. 13	over ¾.″	thr. 2″.	30,920	29,000	94	1,920	6
124	6	do	Sept. 26	r. o. m.	thr. 2″.	50,000	43,300	87	6,700	13
123	7	do	Sept. 23	r. o. m.	thr. 2″.	32,000	27,180	85	4,820	15
126	9	Lower Kittanning.	Oct. 5	r. o. m.	thr. 2″.	12,000	9,700	81	2,300	19
	Virginia:									
134	2	McConnell	Nov. 13	r. o. m.	thr. 2″.	28,000	24,550	88	3,450	12
	West Virginia:									
127	4 B	Upper Freeport.	Oct. 9	r. o. m.	thr. 2″.	26,000	21,000	79	5,600	21
128	16 B	Pittsburg	Oct. 14	s.	s.	22,825	19,800	87	3,025	13
132	17	Bakerstown.	Oct. 27	r. o. m.	thr. 2″.	29,530	24,765	84	4,765	16
135	20	Keystone	Nov. 29	r. o. m.	thr. 2″.	49,150	24,590	87	6,560	13
136	21	Peerless	Dec. 11	r. o. m.	thr. 2″.	24,000	22,000	92	2,000	8
	Wyoming:									
129	3	(?)	Oct. 19	r. o. m.	thr. 2″.	24,120	20,060	85	4,060	15

[a] Detailed account of the field origin and collection of each sample of coal may be found in Bull. U. S. Geol. Survey No. 290, 1906.

Details of washing tests of bituminous coals in 1905—Continued.

Washing test No.	Chemical analyses (per cent). Raw coal. Moisture.	Raw coal. Volatile matter.	Raw coal. Fixed carbon.	Raw coal. Ash.	Raw coal. Sulphur.	Washed coal. Moisture.	Washed coal. Ash.	Washed coal. Sulphur.	Reduction (per cent). Ash.	Reduction (per cent). Sulphur.	Actually removed (per cent). Ash.	Actually removed (per cent). Sulphur.
101	14.43	29.48	42.81	13.28	4.01	15.23	8.64	3.30	35	18	40	24
104	10.69	33.08	36.14	20.09	4.06	16.64	8.59	3.25	57	20	70	43
108	10.83	36.24	39.75	13.18	4.53	12.45	9.30	3.65	29	19	41	32
102	13.54	35.69	40.03	10.74	4.03	15.65	7.57	3.38	30	16	45	34
103	9.50	31.98	47.08	11.44	1.45	11.86	6.67	1.38	42	5	48	17
106	8.20	32.26	46.59	12.95	3.48	13.30	8.91	2.48	31	29	39	37
107	8.31	31.65	49.56	10.48	1.55	11.15	7.49	1.27	29	18	34	25
105	12.77	34.68	40.77	11.78	4.16	16.32	9.37	3.29	20	21	29	29
110	9.95	34.76	42.06	13.23	3.87	11.81	8.41	3.00	36	23	54	44
111	8.43	30.08	51.89	9.60	1.14	10.14	8.06	1.02	16	11	25	20
109	12.39	36.89	41.80	8.92	3.92	14.99	5.77	2.98	35	24	48	39
115	13.18	31.92	39.27	15.63	4.79	15.02	8.61	3.25	45	32	60	51
112	13.99	29.40	42.29	14.32	2.31	16.49	7.25	1.94	49	16	62	37
113	10.80	36.09	40.49	12.62	4.39	11.65	9.83	3.49	22	21	38	36
114	8.90	38.52	43.37	9.21	3.74	10.16	7.89	3.24	14	13	25	25
118	9.55	36.19	43.65	10.61	3.72	11.76	9.52	3.18	10	15	16	20
117	13.53	34.80	40.91	10.76	3.15	14.55	8.14	2.56	24	19	35	30
116	10.72	39.29	41.42	8.57	3.83	10.67	6.15	3.34	28	13	39	26
130	2.33	16.11	68.43	13.13	1.49	3.67	10.61	1.09	19	27	34	47
119	7.71	38.32	42.02	11.95	4.61	9.25	8.57	3.72	28	19	37	29
121	9.01	35.85	43.80	11.34	4.02	10.77	7.42	2.95	35	27	48	42
122	9.90	33.66	44.86	11.58	1.81	9.96	7.74	1.36	33	25	51	44
125	3.53	37.45	49.90	9.12	3.47	3.33	7.48	3.27	17	6	27	15
133	5.31	36.72	49.45	8.52	3.33	6.16	6.38	2.94	25	12	36	25
138	6.65	33.94	48.86	10.55	3.13	7.47	6.37	2.16	40	31	47	39
137	7.55	38.00	46.08	8.37	2.84	11.77	6.03	2.07	28	27	35	35
131	8.10	36.87	43.10	11.93	3.35	9.49	7.45	2.88	38	14	49	31
120	2.46	34.48	57.01	6.05	.88	4.91	4.57	.90	24	....	29	3
124	3.24	31.78	52.46	12.52	1.94	4.31	7.26	1.47	42	24	50	35
123	4.09	20.62	62.82	12.47	2.08	5.67	10.08	1.55	19	25	31	37
126	3.09	17.29	68.29	11.33	2.04	4.58	8.75	1.24	22	39	30	51
134	3.35	35.13	55.94	5.58	.92	6.39	3.95	.88	29	4	38	16
127	3.91	26.68	59.30	10.11	1.07	4.47	7.76	.81	23	24	39	31
128	5.57	31.61	54.45	8.37	1.20	5.41	5.91	.92	29	23	39	33
132	3.46	27.29	61.13	8.12	1.45	5.33	5.50	1.14	32	21	43	34
135	2.82	32.20	56.95	8.03	1.38	5.70	4.64	1.07	42	22	50	33
136	3.57	36.38	55.20	4.85	1.32	6.35	3.47	1.00	28	24	34	30
129	15.12	34.36	33.82	16.70	6.66	19.16	6.52	4.16	61	38	67	47

Details of washing tests, January 1, 1906, to June 30, 1907.

Washing test No.	Field No. of fuel.[a]	Designation of bed.	Date of test.	Jig used.[b]	Size of fuel. (See p. 4.) As shipped.	Size of fuel. As used.	Weight of raw fuel (tons).	Amount washed fuel. Weight (tons).	Amount washed fuel. Per cent.
	Alabama:								
163	2 B	Jagger	May 26, 1906	Stewart	r. o. m.	thr. 2″.	7.93	6.85	86
161	3	Underwood or Thompson.	May 23, 1906	.....do	r. o. m.	thr. 2″.	9.00	8.25	92
159	4	Youngblood	May 21, 1906	.....do	r. o. m.	thr. 2″.	8.50	7.23	85
195	5[c]	Black Creek	Jan. 15, 1907	....	....	....	....	....	....
192	6	Pratt	Jan. 12, 1907	Special	r. o. m.	thr. 1″.	12.00	10.75	90
	Argentina:								
187	1		Nov. 13, 1906	Stewart	r. o. m.	thr. 2″.	18.00	9.00	50
187a	1		Dec. 24, 1906	.....do	r. o. m.	thr. 2″.	5.50	3.30	60
	Arkansas:								
139	1 B	Huntington	Dec. 30, 1905	.....do	s.	s.	30.59	23.00	75
141	7 B	Hartshorne	Jan. 15, 1906	.....do	s.	s.	25.00	19.00	76
144	8	(?)	Jan. 29, 1906	.....do	No. 4.	thr. 2″.	11.50	9.78	85
140	9	Huntington	Jan. 4, 1906	.....do	s.	s.	38.65	28.67	74
	Illinois:								
142	20	No. 6	Jan. 18, 1906	.....do	sc.	sc.	31.64	28.50	90
160	21	.....do	May 21, 1906	.....do	l.	thr. 2″.	8.50	7.32	86
151	22 A	.....do	Feb. 16, 1906	.....do	l.	sc.	9.70	8.50	88
150	22 B	.....do	Feb. 13, 1906	.....do	sc.	sc.	20.00	16.00	80
146	23 A	.....do	Jan. 31, 1906	.....do	5″ l.	thr. 2″.	14.00	12.00	86

[a] Detailed account of the field origin of each sample of fuel may be found in Bull. U. S. Geol. Survey No. 332.

[b] Stewart jig—speed 35 revolutions per minute, with 6-inch stroke; special jig speed, 70 revolutions per minute, with 2½-inch stroke.

[c] Not enough coal for other than special float and sink tests.

Details of washing tests, January 1, 1906, to June 30, 1907—Continued.

Washing test No.	Field No. of Fuel.	Designation of bed.	Date of test.	Jig used.	Size of fuel. (See p. 4.) As shipped.	Size of fuel. (See p. 4.) As used.	Weight of raw fuel (tons).	Amount washed fuel. Weight (tons).	Amount washed fuel. Per cent.
	Illinois—Cont'd.								
147	23 B	No. 6	Feb. 1, 1906	Stewart	s.	s.	40.00	31.50	79
169	24 A	do	June 8, 1906	do	sc.	sc.	10.00	7.50	75
166	24 B	do	June 1, 1906	do	l.	thr. 2″.	9.37	8.33	89
162	25 A	do	May 24, 1906	do	r. o. m.	thr. 2″.	7.27	6.00	83
164	26	No. 5	May 26, 1906	do	r. o. m.	thr. 2″.	9.00	8.00	89
165	27	No. 6	May 29, 1906	do	r. o. m.	thr. 2″.	9.00	7.77	86
181	28 C	No. 7	Sept. 26, 1906	do	l.	thr. 2″.	12.00	9.96	74
183	29 A	No. 5	Oct. 13, 1906	do	sc.	sc.	9.00	6.87	76
184	29 A	do	Oct. 16, 1906	do	sc.	sc.	29.75	20.75	70
190	30	No. 7	Jan. 5, 1907	do	n.	thr. 2½″.	15.00	11.60	77
190a	30	do	Feb. 11, 1907	Special	n.	thr. 1″.	12.45	10.10	81
196	34 A	No. 5	Feb. 15, 1907	do	sc.	thr. 1″.	24.65	19.55	80
197	34 B	do	Feb. 12, 1907	do	r. o. m.	thr. 1″.	14.00	11.81	85
	Indiana:								
145	12	do	Jan. 30, 1906	Stewart	r. o. m.	thr. 2″.	20.00	17.53	89
185	20	Brazil Black	Nov. 14, 1906	do	sc.	sc.	30.00	20.30	68
	Indian Territory:								
176	2 B	Hartshorne	July 13, 1906	do	s.	s.	19.00	14.53	78
175	8	(?)	July 1, 1906	do	s.	s.	18.80	16.15	86
	Kansas:								
191	2 B	Weir-Pittsburg	Jan. 10, 1907	Special	s.	s.	23.00	18.10	79
191a	2 B	do	Jan. 21, 1907	do	s.	s.	39.00	25.25	65
148	6	do	Jan. 8, 1906	Stewart	l.	thr. 2″.	12.00	11.00	92
	Kentucky:								
143	2 B	(?)	Jan. 19, 1906	do	coke br.	coke br.			
182	9 A	No. 9	Oct. 1, 1906	do	n.	n.	9.56	7.84	82
	Missouri:								
149	5	(?)	Feb. 10, 1906	do	r. o. m.	thr. 2″.	7.65	6.45	84
155	6 [a]	(?)	Feb. 21, 1906	do	l.	thr. 2″.			
152	7 A	(?)	Feb. 17, 1906	do	No. 1 n.	No. 1 n.	12.50	10.73	86
154	7 A [a]	(?)	Feb. 22, 1906						
153	7 B	(?)	Feb. 19, 1906	do	No. 2 n.	No. 2 n.	11.75	9.30	79
	New Mexico:								
168	3 C	Main Raton, or Lower Laramie.	June 6, 1906	do	s.	s.	21.50	19.00	88
174	4 A	do	June 19, 1906	do	r. o. m.	thr. 2″.	10.00	8.14	81
170	4 B	do	June 9, 1906	do	s.	s.	12.00	10.50	88
167	5	do	June 2, 1906	do	r. o. m.	thr. 2″.	7.50	6.65	89
	Ohio:								
193	12	No. 8	Jan. 25, 1907	do	r. o. m.	thr. 2″.	6.70	5.10	76
	Pennsylvania:								
179	12	Pittsburg	Sept. 20, 1906	do	r. o. m.	thr. 2″.	10.60	8.45	80
188	15	B, or Miller	Feb. 4, 1907	Special	r. o. m.	thr. 1″.	20.37	15.25	76
189	17	Upper Freeport.	Feb. 6, 1907	do	r. o. m.	thr. 1″.	7.28	6.30	87
194	20	Lower Kittanning.	Jan. 29, 1907	do	r. o. m.	thr. 1″.	22.21	17.25	78
	Tennessee:								
171	1	Mingo	June 12, 1906	Stewart	r. o. m.	thr. 2″.	10.80	9.30	86
172	5	Brushy Mountain.	June 13, 1906	do	r. o. m.	thr. 2″.	9.22	8.00	87
156	7 B	Wilder	May 1, 1906	do	s.	s.	15.50	10.50	68
157	8 A, 8 B	First above Sewanee.	May 15, 1906	do	r. o. m.	thr. 2″.	49.00	43.00	88
158	9 B, 9 C	Sewanee	May 19, 1906	do	s.	s.	9.69	7.21	75
173	10	Battle Creek	June 14, 1906	do	1″s.	1″s.	30.25	23.70	78
178	11	(?)	Sept. 11, 1906	do	s.	s.	21.00	13.75	65
	Virginia:								
198	6	No. 4	Feb. 1, 1907	Special	r. o. m.	thr. 1″.	8.31	6.75	81
	West Virginia:								
186	22 A	(?)	Oct. 25, 1906	Stewart	n. & s.	n. & s.	19.25	16.25	85
180	23 B	Cedar Grove	Sept. 25, 1906	do	n. & s.	n. & s.	18.00	16.99	94
	Miscellaneous:								
177	10		Aug. 7, 1906	do	s.	s.	28.28	20.08	71

[a] Destroyed by fire when plant was burned.

Details of washing tests, January 1, 1906, to June 30, 1907—Continued

Washing test No.	Amount of refuse.		Chemical analyses of fuel (per cent).								Reduction (per cent).		Actually removed (per cent).	
			Raw.					Washed.						
	Weight (tons).	Per cent.	Moisture.	Volatile matter.	Fixed carbon.	Ash.	Sulphur.	Moisture.	Ash.	Sulphur.	Ash.	Sulphur.	Ash.	Sulphur.
163	1.08	14	3.95	30.70	50.76	14.59	1.12	6.29	9.39	1.22	36	......	45	1
161	.75	8	3.03	30.94	55.31	10.71	.49	5.82	10.01	.58	7	......	14	......
159	1.26	15	6.43	28.56	52.09	12.92	1.08	6.82	38.1	1.03	71	5	74	19
195	......	......	5.69	53.28	25.05	16.08	1.40	......	......	......	......	......	......	......
192	1.25	10	3.39	63.57	26.20	6.84	.59	6.69	4.76	.59	30	......	37	10
187	9.00	50	7.10	30.97	19.37	42.56	.82	17.29	29.67	.64	30	22	65	61
187a	2.20	40	7.10	30.97	19.37	42.56	.82	22.73	34.57	.55	19	33	51	60
139	7.59	25	7.49	15.16	59.38	17.97	1.06	6.32	8.62	1.12	52	......	64	21
141	6.00	24	6.89	15.23	62.88	15.00	2.24	6.45	7.19	1.89	52	16	64	36
144	1.71	15	5.19	10.49	70.31	14.01	2.05	5.03	7.85	2.03	44.	1	52	17
140	9.97	26	5.26	14.71	55.22	24.81	1.00	7.78	14.30	.98	42	2	57	27
142	3.14	10	14.68	31.32	40.32	13.68	3.88	16.80	10.26	3.21	25	17	33	25
160	1.18	14	15.30	30.59	43.40	10.71	1.43	8.25	8.09	1.25	25	13	35	25
151	1.20	12	11.91	35.65	39.43	13.01	5.34	14.02	8.58	3.69	34	31	42	39
150	4.00	20	13.03	32.65	39.79	14.53	4.35	16.78	9.99	3.79	31	13	45	30
146	2.00	14	13.47	34.35	40.65	11.53	4.41	13.81	8.78	3.44	24	20	35	31
147	8.50	21	15.68	31.28	37.45	15.59	3.98	16.83	8.75	3.22	44	19	56	36
169	2.50	25	11.44	33.93	43.92	10.71	4.94	15.10	9.75	3.18	9	36	32	52
166	1.04	11	11.44	33.93	43.92	10.71	4.94	14.36	8.38	3.31	22	33	30	41
162	1.27	17	11.35	34.62	40.63	13.40	4.76	14.14	8.98	3.05	33	36	44	47
164	1.00	11	15.68	32.41	39.82	12.09	3.52	15.96	9.40	2.76	22	22	30	36
165	1.22	14	16.00	32.41	37.82	13.77	4.05	16.11	7.76	3.26	43	20	52	31
181	2.03	26	7.78	29.85	52.39	9.98	1.32	9.75	7.12	1.05	29	20	47	42
183	2.12	24	13.10	30.78	40.12	16.00	4.17	15.86	7.70	3.06	52	27	63	44
184	9.00	30	13.10	30.78	40.12	16.00	4.17	15.86	7.70	3.06	52	27	66	49
190	3.40	23	11.69	39.42	35.70	13.19	4.38	12.36	9.44	3.26	28	26	45	40
190a	2.35	19	11.69	39.42	35.70	13.19	4.38	13.67	7.89	3.15	40	28	52	42
196	5.10	20	9.33	47.86	30.92	11.89	2.76	8.68	7.44	2.19	37	21	50	37
197	2.19	15	7.81	50.27	33.54	8.38	2.36	10.12	6.52	1.76	21	26	34	37
145	2.47	11	10.57	35.30	42.75	11.65	3.87	14.16	7.85	3.29	33	15	39	24
185	9.70	32	16.91	38.87	26.85	17.37	1.89	16.86	7.09	1.35	59	29	72	51
176	4.47	22	6.27	32.37	47.07	14.29	1.79	6.61	8.27	1.55	42	13	55	32
175	2.65	14	3.77	32.65	51.15	13.43	1.79	8.97	8.46	1.56	37	13	46	25
	4.90	21	8.01	45.22	26.39	20.38	4.70	12.11	8.88	3.72	56	21	62	37
191a	13.75	35	8.01	45.22	26.39	20.38	4.70	9.53	10.87	3.80	47	19	65	48
148	1.00	8	9.04	29.69	45.55	15.72	5.01	12.63	10.16	2.47	35	51	41	55
143	......	......	......	......	......	46.30	......	26.10	......	......	44	......	......	......
182	1.71	18	8.70	35.00	47.34	8.96	3.14	9.09	7.22	2.61	19	17	34	32
149	1.20	16	12.92	33.64	39.82	13.62	5.03	13.93	9.08	3.62	33	28	44	40
155	......	......	......	......	......	......	......	......	......	......	......	......	......	......
152	1.76	14	16.36	29.12	35.01	19.51	3.53	17.30	9.45	3.04	52	14	58	15
154	......	......	......	......	......	......	......	......	......	......	......	......	......	......
153	2.45	21	16.39	29.01	34.42	20.18	3.12	19.70	11.05	3.07	45	2	56	22
168	2.50	12	4.36	32.21	47.51	15.92	.83	6.01	12.43	.71	22	15	25	25
174	1.86	19	2.78	34.31	48.34	14.57	.61	3.71	11.39	.58	22	5	37	23
170	1.50	12	3.38	34.63	48.45	13.54	.61	5.97	9.41	.65	31	......	39	7
167	.85	11	2.72	31.85	50.86	14.57	.69	4.68	11.87	.91	25	......	28	......
193	1.60	24	4.14	47.18	39.30	9.38	3.96	6.85	6.19	3.60	33	9	50	31
179	2.15	20	1.96	30.55	58.24	9.25	2.19	4.63	6.40	1.39	31	37	45	49
188	5.12	25	3.13	69.45	17.61	9.81	3.77	6.45	5.38	1.53	45	59	59	62
189	.98	13	4.35	55.99	27.76	11.90	1.51	5.18	8.02	1.16	33	23	41	33
194	4.96	22	4.00	69.57	15.89	10.54	2.85	6.48	6.76	1.30	36	54	50	65
171	1.50	14	4.81	32.91	51.13	11.15	1.58	5.28	5.33	1.32	52	16	58	28
172	1.22	13	5.59	33.62	51.03	9.76	3.23	5.29	5.64	2.46	43	24	50	34
156	5.00	32	7.88	28.28	46.43	17.41	3.43	7.04	10.12	2.26	42	34	60	55
157	6.00	12	3.12	32.91	49.85	14.12	4.74	1.71	9.99	2.94	29	38	38	45
158	2.48	23	5.68	25.36	50.41	18.55	.74	4.02	9.91	.85	47	......	60	14
173	6.55	22	2.92	......	......	22.74	.95	7.02	13.75	.98	40	......	53	20
178	7.25	35	3.53	20.75	47.85	27.87	.90	5.60	13.47	.92	52	......	69	33
198	1.56	19	5.62	61.52	23.07	9.79	1.21	6.36	4.38	1.30	57	......	64	13
186	3.00	15	4.59	52.23	33.38	9.80	1.01	7.06	5.76	.97	41	4	50	19
180	1.01	6	3.25	34.61	54.56	7.58	1.22	4.24	4.87	.93	34	24	40	29
177	8.20	29	6.67	31.61	51.19	10.53	1.55	11.06	6.38	1.30	39	16	57	41

Details of special washing tests, January 5 to February 15, 1907.

Washing test No.	Field No. of fuel.	Date and duration of test.	Float and sink tests with finer crushing.								
			Special test No.	Size—through square hole (inch).	Specific gravity of solution used.	Float (per cent).	Sink (per cent).	Analysis of float (per cent)			
								Ash.		Sulphur.	
								Determined.	Reduction.	Determined.	Reduction.
	Alabama:										
195	5	Jan. 15	1	¾	1.35	81	19	2.18	86	0.81	42
			2	¾	1.40	85	15	2.63	84	.98	30
			3	¾	1.45	87	13	2.66	84	1.05	25
			4	¾	1.52	87	13	3.19	80	1.13	19
a 192	6	Jan. 12, 1¼ hours	1	¾	1.36	87	13	2.81	59	.54	8.5
			2	¾	1.42	90	10	3.51	49	.57	4
			3	¾	1.48	91	9	3.43	50	.53	10
			4	¾	1.56	94	6	3.75	45	.56	5
	Argentina:										
187	1		1	¾	1.55	45	55	22.56	47	.73	12
			2	¾	1.60	59	41	24.96	41	.78	12
			3	¾	1.65	59	41	27.68	35	.72	12
			4	¾	1.70	61	39	27.90	34	.70	12
	Illinois:										
190	30	Jan. 5, 2 hours.	1	¾	1.36	73	27	7.10	46	3.29	23
			2	¾	1.41	84	16	8.69	34	3.29	23
			3	¾	1.47	88	12	8.98	31	3.33	23
			4	¾	1.56	90	10	9.59	27	3.41	22
196	34 A	Feb. 15, 4¼ hours	1	¾	1.36	84	16	6.07	49	1.90	31
			2	¾	1.41	88	12	6.12	48	1.83	34
			3	¾	1.45	90	10	7.06	41	2.18	21
			4	¾	1.51	92	8	7.10	40	1.97	29
a 197	34 B	Feb. 12, 2 hours.	1	1	1.35	87	13	5.91	29	1.71	28
			2	1	1.41	90	10	6.15	27	1.64	31
			3	1	1.46	92	8	6.20	26	1.68	29
			4	1	1.51	92	8	7.23	14	2.17	8
	Kansas:										
191	2 B	Jan. 10, 2 hours.	1	Slack.	1.36	66	34	4.48	78	2.63	44
			2	Slack.	1.41	74	26	5.31	74	2.78	41
			3	Slack.	1.47	78	22	5.73	72	3.19	32
			4	Slack.	1.56	81	19	6.18	70	3.31	30
	Ohio:										
193	12	Jan. 25, ⅝ hour.	1	¾	1.35	77	23	5.12	45	3.23	18
			2	¾	1.40	89	11	6.43	32	3.63	8
			3	¾	1.45	92	8	6.78	28	3.88	2
			4	¾	1.52	94	6	7.31	22	3.98	......
	Pennsylvania:										
a 188	15	Feb. 4, 2 hours.	1	½	1.35	72	28	5.47	44	1.30	66
			2	½	1.41	78	22	5.27	46	1.45	62
			3	½	1.45	80	20	5.54	43	1.54	59
			4	½	1.52	81	19	6.26	36	1.71	55
189	17	Feb. 6, 1½ hours	1	¾	1.35	86	14	5.14	57	1.00	34
			2	¾	1.40	90	10	5.69	52	1.08	28
			3	¾	1.45	91	9	6.20	48	1.26	17
			4	¾	1.52	91	9	7.51	37	1.13	25
a 194	20	Jan. 29, 2¾ hours	1	¾	1.35	83	17	4.95	53	.93	67
			2	¾	1.42	88	12	5.66	46	1.24	57
			3	¾	1.45	88	12	4.72	55	1.02	64
			4	¾	1.52	89	11	6.07	42	1.09	62
	Virginia:										
a 198	6	Feb. 1, 1¼ hours	1	¾	1.35	84	16	2.60	54	.95	21
			2	¾	1.41	85	15	2.98	48	.92	24
			3	¾	1.45	85	15	3.44	42	.95	21
			4	¾	1.53	87	13	3.53	41	.97	20

a Finer crushing advantageous.

Details of special washing tests, January 5 to February 15, 1907—Continued.

Washing test No.	Float and sink tests on refuse.						Loss of good coal in refuse (per cent).	Analysis of refuse (per cent).		
	Special test No.	Specific gravity of solution used.	Percentage of float: To refuse.	Percentage of float: To total sample.	Analysis of float (per cent): Ash.	Analysis of float (per cent): Sulphur.		Moisture.	Ash.	Sulphur.
a 192	1	1.35	18.40	1.91	2.81	0.89	1.00	8.21	34.92	2.20
	2	1.40	20.80	2.16	3.48	1.01				
	3	1.45	20.80	2.16	4.06	1.17				
	4	1.52	22.30	2.32	5.09	1.06				
190	1	1.36	15.80	2.98	8.00	3.12	2.98	11.22	46.50	9.59
	2	1.40	20.18	4.13	11.30	3.42				
	3	1.45	29.90	5.63	12.00	3.43				
	4	1.51	33.50	6.31	14.60	4.63				
196	1	1.35	12.10	2.52	6.95	2.05	2.52	9.29	58.43	11.91
	2	1.41	13.59	2.82	7.78	2.32				
	3	1.45	14.21	2.95	9.58	2.45				
	4	1.51	16.78	3.43	11.20	3.05				
a 197	1	1.35	50.00	7.80	6.27	2.36	1.75	15.35	61.00	15.90
	2	1.40	52.00	8.14	5.99	2.50				
	3	1.45	55.00	8.60	7.40	2.79				
191	1	1.35	9.00	1.94	4.30	2.58	2.16	....	76.50	11.32
	2	1.40	10.00	2.16	5.05	2.93				
	3	1.46	10.00	2.16	7.53	3.57				
	4	1.53	10.00	2.16	7.71	3.81				
193	1	1.35	39.00	9.35	5.75	3.67	9.00	5.78	19.91	6.62
	2	1.41	57.00	13.29	6.42	4.04				
	3	1.45	59.00	14.09	9.12	5.26				
	4	1.53	81.00	19.30	10.17	4.97				
a 188	1	1.35	11.80	2.95	4.95	1.71	2.00	5.78	47.18	19.78
	2	1.41	13.20	3.30	6.50	2.13				
	3	1.46	14.50	3.64	7.65	2.29				
	4	1.51	17.20	4.30	8.15	2.88				
189	1	1.35	13.00	1.70	5.39	1.28	1.50	4.58	41.50	8.85
	2	1.41	14.00	1.80	6.20	1.40				
	3	1.45	19.30	2.60	8.15	1.47				
	4	1.51	23.75	3.20	9.51	1.67				
a 194	1	1.35	17.20	3.91	5.42	1.69	2.00	10.21	46.25	17.40
	2	1.41	18.50	4.20	5.69	1.69				
	3	1.45	19.88	4.51	6.45	2.15				
	4	1.53	20.20	4.59	7.89	2.08				
a 198	1	1.35	15.30	2.90	4.80	1.39	2.20	3.64	63.98	6.15
	2	1.41	15.75	2.99	5.35	1.78				
	3	1.45	15.90	3.02	5.62	1.75				
	4	1.51	19.25	3.65	9.31	2.79				

a Finer crushing advantageous.

COKING TESTS.

By A. W. Belden.

EQUIPMENT.

The ovens in which the tests of the coking qualities of coals have been made are of the regular beehive pattern. Of the battery of three ovens two are of standard size, 12 feet in diameter and 7 feet high, the third is 12 feet in diameter and 6 feet 4 inches high. This change was made by raising the bottom of one of the standard ovens 8 inches with well-tamped loam and bottom tile of the usual size. The object of the change was to bring the charge nearer the dome of the oven and effect a more rapid penetration of heat.

For the first nineteen tests the small oven only was used. In the twentieth charge one of the 7-foot ovens was blown in, and two ovens were used continuously during the remainder of the work—one of each size. Owing to the small supply of coal it has not been possible to use more than two ovens, and they may, therefore, be considered as end ovens. Some suppose that end ovens yield results less favorable than those from ovens located between other heated ovens, but, even if this supposition is correct, the difference is fully balanced by the greater care bestowed on these experimental ovens as compared with ovens operated under normal conditions. As both of the ovens used are, in the sense indicated, end ovens, the results obtained in each are comparable one with the other.

In charging the ovens for the first nineteen tests the larry used held less than 1 ton. This necessitated the filling and emptying of the larry six to eight times before the charge was completed. Each portion thus became hot and began invariably to gas, and often to blaze before the next portion of the charge was added. This unfortunate state of affairs is believed to be responsible, at least in some measure, for cross lamination and cross breakage of the coke, layers of coal as charged showing plainly in many of these tests in each oven drawn. The average time of charging with this device was about one hour. After the nineteenth charge a standard-size larry was installed and the time of charging was reduced to an average of seven minutes. With this change the lamination and cross breakage referred to disappeared, showing that the whole charge should be put in at once.

PERSONNEL.

The writer took charge of this work in May, 1905, succeeding Fred W. Stammler, of Johnstown, Pa. He was assisted by W. E. Vickers, of Pocahontas, Va., to whom in large measure is due whatever success has been obtained during these investigations.

PROCEDURE OF TESTS.

All coal was finely crushed through a Williams mill unless otherwise tested for definite comparison of results, and these exceptions are noted in the subjoined detailed report (pp. 21–26). The coals not crushed were, when unloaded from the cars, put through rolls having an aperture of $1\frac{1}{4}$ inches. The coals put through the Williams mill will vary somewhat, depending on the nature of the coal, but will practically all pass through a 10-mesh sieve, as shown by the following report by the laboratory on an average sample: Amount remaining on 10-mesh, 15.08 per cent; on 20-mesh, 35.71 per cent; on 30-mesh, 12.89 per cent; on 40-mesh, 8.53 per cent; on 60-mesh, 9.33 per cent; on 100-mesh, 9.13 per cent; through 100-mesh, 9.33 per cent.

Both the door and the trunnel head of the oven were always closed directly after the oven was drawn and it was allowed to gather heat, the length of time varying as necessity demanded. The average time was one and one-half hours.

The sample of coal was taken at regular intervals as the charge was emptied from bin to larry, by means of a small shovel holding about one-fourth pound. The total weight of the sample averaged 45 pounds.

The sample of coke was taken from five different parts of the oven, as nearly as possible from the same location for each test, as follows: 2 feet from the oven door; 2 feet from each side, on a line drawn from the center of the oven; at the center; and 2 feet from the back wall, on a line with the point of selection of the pieces taken from the door and the center. The separate pieces of coke extended the whole height of the charge and were as nearly uniform in size as possible.

In beginning the series of tests, before the ovens were fully seasoned, the first charges showed a rather large percentage of breeze, and black butts due to cold bottom were produced. It was unfortunate that these first tests should have been made on coals that were supposedly noncoking, as the condition of the oven did not permit it to give as effective service as it would probably have given under other and more favorable conditions.

EXTENT OF TESTS.

In the scope of this report, covering the period from July 7, 1905, to February 20, 1907, are included results from 192 tests of 102 coals from seventeen States and one Territory, as shown in the accom-

panying table. Of these tests, 100 were made on raw coal, 82 on washed coal, 1 on raw coal with the addition of pitch, 6 on washed coal with the addition of pitch, 1 on washed coal with the addition of asphalt, and 2 on coals of widely varying composition. Of the 102 different coals, 8, viz, Arkansas No. 9, Illinois No. 19, Indiana Nos. 3 and 18, Ohio No. 3, Maryland No. 1, and Wyoming Nos. 3 and 5, produced no coke. Arkansas No. 9 and Maryland No. 1 were coked by the addition of pitch to washed coal. Four tests were made on Pennsylvania No. 9 (pp. 24, 32, 41); two tests with raw coal gave only a few pieces of coke; a third, with washed coal, produced coke of inferior quality; and the fourth, with the addition of 5 per cent pitch to raw coal, produced coke of no better quality than that from washed coal. Of Indiana No. 3, Ohio No. 3, and Wyoming Nos. 3 and 5, there was not enough for further tests.

TABULATION OF RESULTS.

The results of the coking tests will be found in the detailed report on each sample, presented below. For convenience of comparison data are given as to the yield of dry coke from dry coal as well as coke as received from coal as charged. The analyses of both coal and coke as received and on dry basis are also given. No distinction is made between breeze and ash, as it was found impossible to separate them with any degree of accuracy, and both are represented in this report in the item "breeze." This breeze includes everything that will pass through a fork with tines $1\frac{1}{4}$ inches apart, after thorough shaking, and its percentage is much higher than that from regular operations, but is comparable in all tests. It was not deemed necessary or advisable to size the coke, and under this caption is included everything over the $1\frac{1}{4}$-inch tine fork. Except in a few special cases the determination of phosphorus was not made on coke having over 2 per cent of sulphur, and when more than one test was made on a coal in the same condition this determination was also omitted.

Details of coking tests of coals, January 1, 1905, to June 30, 1907.

Test No.	Field No. of coal.	Origin of coal sample.[a] Designation of bed.	Origin of coal sample.[a] At or near—	Duration of test (hours).	Size of coal (see p. 4). As shipped.	Size of coal (see p. 4). As used.	Physical properties of coke. Specific gravity. Real.	Specific gravity. Apparent.	Pounds per cubic foot. Dry.	Pounds per cubic foot. As received (wet).	Percentage by volume. Coke.	Percentage by volume. Cells.	6-foot drop test: Percentage over 2-inch mesh. 1.	2	3.	4.
1	2	3	4	5	6	7	8	9	10	11	12	13	14	15	16	17
	Alabama:															
142	2 B (w.)	Jagger	Carbon Hill	51	r. o. m.	f. c.	1.88	0.92	55.63	87.44	49.00	51.00	93.00	78.50	77.50	58.00
138	3	Underwood or Thompson.	Garnsey	54	r. o. m.	f. c.	1.91	1.04	63.51	92.20	54.00	46.00	97.50	94.50	92.00	88.00
139	3 (w.)	do	do	44	r. o. m.	f. c.	1.99	.95	58.67	91.10	48.00	52.00	95.00	90.00	87.00	83.50
131	4	Youngblood	Belle Ellen	47	r. o. m.	f. c.	1.95	.96	59.70	91.52	49.00	51.00	96.00	91.50	86.00	82.00
136	4 (w.)	do	do	49	r. o. m.	f. c.	1.95	.87	54.06	88.35	45.00	55.00	92.00	88.00	83.50	81.00
171	5	Black Creek	Lehigh	42	r. o. m.	f. c.	1.99	.98	60.77	92.58	49.00	51.00	95.50	92.50	88.50	86.00
172	6	Pratt	Dolomite	40	r. o. m.	f. c.	1.97	.93	57.72	90.79	47.00	53.00	93.50	87.50	83.50	79.50
174	6 (w.)	do	do	50	r. o. m.	f. c.	1.95	.91	56.43	89.50	47.00	53.00	94.50	91.50	88.00	85.00
	Arkansas:															
95	1 B (w.)	Huntington	Huntington	49	s.	s.	1.78	.58	35.13	76.92	33.00	67.00	97.00	94.50	90.50	88.00
96	1 B (w.)	do	do	71	s.	f. c.	1.90	.75	46.18	83.59	40.00	60.00				
97	1 B (w.)[b]	do	do	48	s.	s.	1.96	.83	50.37	86.53	42.00	58.00	96.50	93.00	90 50	87.00
100	1 B (w.)[c]	do	do	50	s.	s.	1.95	.68	42.33	82.87	35.00	65.00				
104	7 B (w.)	Hartshorne	Midland	67	s.	s.	2.01	.71	44.20	84.73	35.00	65.00				
105	7 B (w.)[c]	do	do	57	s.	s.	1.97	.93	57.61	90.68	47.00	53.00	94.50	90.50	88.00	87.50
98	9 (w.)	Huntington	Bonanza	28	1⅛″ s.	f. c.										
99	9 (w.)	do	do	24	1⅛″ s.	s.										
101	9 (w.)[d]	do	do	39	1⅛″ s.											
102	9 (w.)[b]	do	do	43	1⅛″ s.		2.04	1.00	58.37	90.18	49.00	51.00	97.50	94.50	92.50	90.00
103	9 (w.)[c]	do	do	46	1⅛″ s.		2.02	.94	58.45	91.52	47.00	53.00				
	Georgia:															
173	1	Little River	Menlo	58	over 1½″.	f. c.	2.01	.98	60.85	92.66	49.00	51.00	99.00	98.00	96.50	95.00
	Illinois:															
1	7 D*	No. 6	Collinsville	43	r. o. m.	f. c.	1.91	.85	51.82	86.11	45.00	55.00	92.50	86.50	78.00	73.50
4	7 D (w.)*	do	do	65	r. o. m.	f. c.	1.85	.82	50.60	85.53	44.00	56.00	91.50	84.50	77.50	75.00
5	11 D (w.)*	No. 7	Carterville	48	No. 3.	f. c.	1.87	.82	50.14	85.08	44.00	56.00	95.50	85.00	80.50	75.00
2	13 (w.)*	do	Benton	65	1½″ by 6″ e.	f. c.	1.85	.84	49.99	83.67	46.00	54.00	93.50	87.50	82.50	75.00
3	13*	do	do	65	1½″ by 6″ e.	f. c.	1.90	.90	54.60	87.67	47.00	53.00	95.00	89.50	85.50	81.00
7	16*	do	Herrin		l., e.	f. c.										
10	16 (w.)*	do	do	66	l., e.	f. c.	1.85	.87	53.11	86.18	47.00	53.00	93.50	84.50	80.50	76.00

[a] Additional details of origin of samples tested in 1905 (designated by * in column 2) can be found in Bull. U. S. Geol. Survey No. 290; of other samples in Bull. No. 332.
[b] With 10 per cent pitch.
[c] With 5 per cent pitch.
[d] With 3½ per cent asphalt.

Details of coking tests of coals, January 1, 1905, to June 30, 1907—Continued.

Test No.	Field No. of coal.	Origin of coal sample. Designation of bed.	Origin of coal sample. At or near—	Duration of test (hours).	Size of coal (see p. 4). As shipped.	Size of coal (see p. 4). As used.	Physical properties of coke. Specific gravity. Real.	Specific gravity. Apparent.	Pounds per cubic foot. Dry.	Pounds per cubic foot. As received (wet).	Percentage by volume. Coke.	Percentage by volume. Cells.	6-foot drop test: Percentage over 2-inch mesh. 1.	2.	3.	4.
1	2	3	4	5	6	7	8	9	10	11	12	13	14	15	16	17
	Illinois—Con'td.:															
11	19 A*	No. 7	Zeigler	48	¾″ s.	f. c.										
15	19 A*	do	do	24	¾″ s.	f. c.										
19	19 B*	do	do	47	¾″ s.	f. c.										
106	20 (w.)	No. 6	Staunton	47	sc.	f. c.	1.85	0.90	55.82	87.63	49.00	51.00	92.00	86.50	82.00	75.00
107	20 (w.)	do	do	36	sc.	f. c.	1.82	.84	52.12	85.80	46.00	54.00	94.00	87.50	82.00	75.50
126	21	do	Troy	44	l.	f. c.										
137	21 (w.)	do	do	45	l.	f. c.										
117	22 B	do	Maryville	45	sc.	f. c.	1.89	.98	60.50	90.45	52.00	48.00	95.50	88.50	83.00	75.50
118	22 B (w.)	do	do	76	sc.	f. c.	1.84	.89	55.17	87.59	48.00	52.00	89.00	79.50	73.00	68.50
111	23 A (w.)	do	Donkville	39	l.	f. c.	1.85	.79	48.92	84.47	43.00	57.00	88.50	78.00	68.00	62.00
112	23 B (w.)	do	do	43	s.	f. c.	1.81	.79	48.81	83.74	44.00	56.00	89.50	78.50	69.00	62.00
114	23 B (w.)	do	do	72	s.	f. c.	1.86	.85	52.27	85.95	46.00	54.00	88.00	78.00	66.50	58.50
119	24 A	No. 6	New Baden	24	sc.											
155	24 A (w.)	do	do	78	sc.	f. c.										
145	24 B (w.)	do	do	55	l.	f. c.	1.80	.93	54.71	84.66	52.00	48.00				
120	25	do	Germantown	79	r. o. m.	r. o. m.										
140	25 (w.)	do	do	62	r. o. m.	f. c.	1.89	.88	53.42	86.49	47.00	53.00				
143	26 (w.)	No. 5	Lincoln	59	r. o. m.	f. c.	1.80	.89	52.58	84.39	49.00	51.00				
144	27 (w.)	No. 6	Auburn	53	r. o. m.	f. c.	1.82	.84	50.56	84.24	46.00	54.00				
166	28 C (w.)	No. 7	Herrin	60	l.	f. c.	1.83	.86	52.12	85.19	47.00	53.00				
169	29 A (w.)	No. 5	Livingston	74	sc.	f. c.	1.83	.78	48.31	83.86	43.00	57.00	91.50	82.00	74.00	64.00
170	29 A (w.)	do	do	54	sc.	f. c.	1.83	.80	48.54	83.48	44.00	56.00	92.00	84.00	76.00	70.00
190	34 B (w.)	do	Harrisburg	51	r. o. m.	f. c.	1.85	.78	48.58	84.73	42.00	58.00	92.00	84.50	78.00	74.00
	Indiana:															
14	3 (w.)*	do	Boonville	24	n., s.	f. c.										
6	4*	No. 6	Star City	62	sc.	f. c.	1.93	.89	52.01	85.69	46.00	54.00	96.50	90.50	85.50	80.00
9	4 (w.)*	do	do	58	sc.	f. c.	1.86	.79	49.00	84.54	43.00	57.00	87.50	82.50	74.50	68.50
8	5*	No. 5	Hymera	49	r. o. m.	f. c.	1.91	.82	50.37	85.92	43.00	57.00	96.00	89.50	85.00	80.50
12	6 (w.)*	No. 4	do	49	r. o. m.	f. c.	1.89	.85	52.62	86.91	45.00	55.00	92.50	89.00	86.50	80.50
13	7 A (w.)*	No. 5	Littles	112	l., c., n.	f. c.	1.85	.76	46.86	83.67	41.00	59.00	92.50	84.50	79.00	74.50
16	9 A*	No. 7	Macksville	90	1¼″.	f. c.	1.86	.95	58.75	89.31	51.00	49.00	94.50	87.50	82.50	78.00
17	9 B*	do	do	112	r. o. m.	f. c.	1.84	.91	56.39	87.59	50.00	50.00	94.50	86.50	82.50	79.00
18	9 B (w.)*	do	do	90	r. o. m.	f. c.	1.84	.87	53.76	86.83	47.00	53.00	96.50	94.50	91.00	88.50
51	11 D*	No. 4	Dugger	50	l.	f. c.	1.83	.84	51.59	85.27	46.00	54.00	94.00	87.50	82.50	79.00
108	12	No. 5	Hartwell	37	r. o. m.	f. c.	1.92	.97	59.97	90.53	51.00	49.00	95.50	91.50	88.50	86.50

109	12 (w.)	do	do	35	r. o. m.	f. c.	1.82	.87	53.91	86.33	48.00	52.00	95.50	90.00	84.50	80.50
110	12 (w.)	do	do	44	r. o. m.	f. c.	1.87	.84	52.16	86.45	45.00	55.00	92.50	89.50	82.00	75.50
163	17 (w.)	do	Bicknell	50	r. o. m.	f. c.	1.92	.81	49.68	85.84	42.00	58.00	94.00	86.50	80.00	74.00
158	18 A (w.)	do	Ayrshire	16	sc.	s.										
168	18 A (w.)	do	do	24	sc.	f. c.										
	Kansas:															
613	6	Weir-Pittsburg	Jewett	47	l.	f. c.	1.97	.94	58.03	90.45	48.00	52.00	94.00	89.50	85.50	82.50
115	6 (w.)	do	do	49	l.	f. c.	1.90	.85	52.69	86.98	45.00	55.00	93.50	88.00	83.50	80.00
	Kentucky:															
76	1 B*	Straight Creek	Straight Creek	51	1" to 3".	f. c.	1.94	.92	56.85	89.27	48.00	52.00	91.00	85.00	75.50	69.50
71	1 C*	do	do	67	1½" s.	f c.	1.88	.94	58.06	89.27	50.00	50.00	90.00	82.00	74.50	61.50
75	5*	High Splint	Big Black Mountain	49	r. o. m.	f. c.	1.84	.91	56.62	87.82	50.00	50.00	89.00	79.00	75.50	69.50
86	6*	No. 1	Paintsville	56	large l.	f. c.	1.79	.93	56.01	85.95	52.00	48.00	86.50	79.50	70.50	62.50
90	6*	do	do	50	large l.	f. c.	1.78	.90	55.21	85.76	51.00	49.00	91.50	84.50	78.50	75.00
85	7*	No. 9	Central City	49	l., n.	f. c.	1.83	.82	50.63	84.92	45.00	55.00	94.50	88.00	85.00	82.50
164	8	No. 1 B	Sturgis	49	r. o. m.	f. c.	1.90	.89	55.25	88.32	47.00	53.00	96.00	92.50	90.00	88.00
165	8	do	do	51	r. o. m.	f. c.	1.90	.91	36.50	88.93	48.00	52.00	96.00	93.00	89.50	86.50
167	9 A (w.)	No. 9	McHenry	51	n.	f. c.	1.86	.80	49.42	84.96	43.00	57.00	93.00	87.50	83.50	79.00
	Maryland:															
50	1*	Lower Kittanning	Westernport	36	r. o. m.	f. c.										
54	1 (w.)*	do	do	48	r. o. m.	r. o. m.										
58	1 (w.)* *a*	do	do	54	r. o. m.	f. c.	1.91	.99	61.61	91.55	52.00	48.00	96.50	94.00	91.00	90.00
	Missouri:															
116	5 (w.)	(?)	Higbee	33	r. o. m.	f. c.	1.88	.84	51.82	86.11	45.00	55.00	92.50	85.50	81.50	78.00
	New Mexico:															
148	3 B	Main Raton, or Lower Laramie.	Van Houten	52	s.	f. c.	1.92	.99	61.30	91.25	52.00	48.00	95.00	89.00	84.00	81.00
149	3 B (w.)	do	do	48	s.	f. c.	1.90	.99	61.23	91.17	52.00	48.00	95.00	91.00	86.00	80.50
152	3 B, 4 B, 5 (w.)	do		48		f. c.	1.91	.96	59.47	90.68	50.00	50.00	96.50	91.00	86.00	80.00
150	4 B	do	Brilliant	49	s.	f. c.	1.95	1.01	62.29	92.24	52.00	48.00	96.00	88.00	81.50	75.00
151	4 B (w)	do	do	43	s.	f. c.	1.92	.96	59.06	90.26	50.00	50.00	93.00	85.00	76.00	70.00
146	5	do	Blossburg	56	r. o. m.	f. c.	1.88	.96	59.32	89.88	51.00	49.00	94.50	88.00	83.50	73.50
147	5 (w.)	do	do	50	r. o. m.	f. c.	1.91	.91	56.20	88.62	48.00	52.00	95.50	91.50	87.00	83.50
	Ohio:															
24	1 (w.) *	No. 4	Wellston	48	r. o. m.	f. c.	1.82	.89	54.79	86.60	49.00	51.00	96.50	92.50	90.00	86.50
27	2 (w.) *	No. 5	do	59	r. o. m.	f. c.	1.85	.99	59.55	88.24	54.00	46.00	95.00	90.50	84.50	78.50
31	3 (w.) *	No. 6	Shawnee	60	r. o. m.	f. c.										
28	4 *	No. 8	Bradley	45	¾"	f. c.	1.85	.89	52.54	84.96	48.00	52.00	97.00	94.50	93.50	91.00
22	5 *	do	Rush Run	55	l "a".	f. c.	1.84	.86	53.19	86.26	47.00	53.00	90.50	82.50	74.50	66.50
59	6 *	do	Neffs	46	r. o. m.	f. c.	1.88	.84	51.97	86.26	45.00	55.00	94.50	90.50	86.50	85.00
66	6 (w.) *	do	do	60	r. o. m.	f. c.	1.82	.78	48.46	84.01	43.00	57.00	95.00	90.00	85.50	81.00
89	7 *	No. 7	Danford	45	l.	f. c.	1.88	.87	53.80	87.48	46.00	54.00	95.00	91.00	87.50	81.50
94	7 (w.) *	do	do	60	l.	f. c.	1.86	.83	51.47	85.76	45.00	55.00	89.50	83.00	75.50	73.00
81	8 *	No. 6	Dixie	52	r. o. m.	f. c.	1.89	.90	55.74	88.16	48.00	52.00	91.00	82.50	75.50	68.50
93	8 (w.) *	do	do	69	r. o. m.	f. c.	1.81	.82	49.49	83.78	45.00	55.00	88.00	75.00	68.00	64.00
72	9 A*	No. 4	Clarion	71	1¼" l.	f. c.	1.86	.85	52.04	85.73	46.00	54.00	84.00	81.00	75.00	67.00
55	9 B*	do	do	53	n., s.	f. c.	1.94	.93	57.57	89.99	48.00	52.00	90.00	81.00	74.50	70.50
57	9 B (w.) *	do	do	57	n., s.	f. c.	1.82	.83	51.44	85.12	46.00	54.00	92.50	85.00	80.00	74.50
180	12 (w.)	No. 8	Bellaire	45	r. o. m.	f c.	1.90	.82	50.75	86.30	43.00	57.00	92.50	85.00	79.00	72.50

a With 10 per cent pitch.

Details of coking tests of coals, January 1, 1905, to June 30, 1907—Continued.

Test No.	Field No. of coal.	Origin of coal sample: Designation of bed.	Origin of coal sample: At or near—	Duration of test (hours).	Size of coal (see p. 4): As shipped.	Size of coal: As used.	Specific gravity: Real.	Specific gravity: Apparent.	Pounds per cubic foot: Dry.	Pounds per cubic foot: As received (wet).	Percentage by volume: Coke.	Percentage by volume: Cells.	6-foot drop test: Percentage over 2-inch mesh: 1.	2.	3.	4.
1	2	3	4	5	6	7	8	9	10	11	12	13	14	15	16	17
	Pennsylvania:															
25	5*	Pittsburg	Ellsworth	62	$\frac{3}{4}''$	f. c.	1.92	0.94	58.33	90.14	49.00	51.00	94.00	80.50	77.50	72.00
26	5 (w.) *	do	do	92	$\frac{3}{4}''$	f. c.	1.84	.83	51.66	85.95	45.00	55.00	91.00	81.50	74.50	67.00
32	6*	do	East Millsboro	46	r. o. m.	f. c.	1.96	1.09	67.74	95.17	56.00	44.00	95.00	91.50	88.00	84.50
34	6 (w.) *	do	do	45	r. o. m.	f. c.	1.92	1.05	65.34	93.42	55.00	45.00	91.00	84.50	80.50	75.50
35	6*	do	do	88	r. o. m.	f. c.	1.91	1.11	68.88	95.10	58.00	42.00	......	......	......	......
38	6 (w.) *	do	do	86	r. o. m.	f. c.	1.84	.97	59.97	89.27	53.00	47.00	97.50	95.50	94.00	92.00
41	6*	do	do	72	r. o. m.	f. c.	1.91	1.18	73.42	97.12	62.00	38.00	96.00	91.50	88.00	74.50
30	7*	do	Ligonier	90	r. o. m.	f. c.	1.92	.94	58.10	89.92	49.00	51.00	94.50	88.50	84.00	80.00
33	7 (w.) *	do	do	93	r. o. m.	f. c.	1.83	.91	56.54	87.74	50.00	50.00	91.50	86.00	81.00	78.00
29	8*	Lower Kittanning	Ehrenfeld	51	r. o. m.	f. c.	1.76	.65	40.16	79.44	37.00	63.00	94.50	88.50	84.00	80.00
37	9*	do	Kimmelton	45	r. o. m.	f. c.	......	......	......	......	......	......	......	......	......	......
39	9*	do	do	66	r. o. m.	f. c.	......	......	......	......	......	......	......	......	......	......
42	9 (w.) *	do	do	51	r. o. m.	f. c.	1.99	.85	52.69	88.24	43.00	57.00	98.50	96.50	95.50	95.00
56	9 * *a*	do	do	38	r. o. m.	f. c.	1.94	.87	53.87	88.16	45.00	55.00	97.00	94.50	93.00	92.00
47	10*	Pittsburg	Bruce	49	$\frac{3}{4}''$	......	1.85	.87	54.03	87.10	47.00	53.00	93.00	88.60	84.00	79.50
53	10*	do	do	47	$\frac{3}{4}''$	f. c.	1.92	.84	52.20	87.13	44.00	56.00	93.50	90.00	85.00	82.00
159	11	do	Charleroi	41	r. o. m.	f. c.	1.92	1.00	62.03	91.97	52.00	48.00	93.50	89.50	85.50	80.00
161	12	do	Acheson	47	r. o. m.	f. c.	1.97	.98	60.69	91.90	50.00	50.00	......	......	......	......
162	12 (w.)	do	do	48	r. o. m.	f. c.	1.95	.92	57.07	90.14	47.00	53.00	96.00	90.50	87.00	80.50
185	15 (w.)	B. or Miller	Wehrum	61	r. o. m.	f. c.	1.98	.72	44.65	84.58	36.00	64.00	97.00	94.00	92.00	90.00
188	15 (w.)	do	do	54	r. o. m.	......	2.01	.78	48.39	86.45	39.00	61.00	97.50	94.50	93.50	90.50
178	17	Upper Freeport	White	52	r. o. m.	f. c.	2.04	1.00	62.22	94.03	49.00	51.00	95.00	90.00	86.50	83.50
186	17 (w.)	do	do	44	r. o. m.	f. c.	1.96	.88	54.75	89.04	45.00	55.00	94.50	92.00	90.50	87.50
176	19	Pittsburg	Herminie	36	r. o. m.	......	1.95	1.10	68.47	95.90	56.00	44.00	87.00	80.00	73.50	67.50
177	19	do	do	40	r. o. m.	f. c.	1.97	1.08	67.28	95.36	55.00	45.00	91.50	84.00	75.00	70.00
179	20	Lower Kittanning	Seward	68	r. o. m.	f. c.	2.04	.86	53.49	89.65	42.00	58.00	98.00	95.50	93.50	92.00
182	20 (w.)	do	do	78	r. o. m.	f. c.	1.95	.73	45.30	84.58	37.00	63.00	......	......	......	......
183	21	Pittsburg	Connellsville	70	r. o. m.	f. c.	1.94	.96	59.47	90.68	50.00	50.00	......	......	......	......
187	21	do	do	78	r. o. m.	f. c.	1.90	.92	57.04	89.46	48.00	52.00	96.50	94.00	90.00	87.50
189	21	do	do	51	r. o. m.	......	1.93	.95	58.75	90.56	49.00	51.00	92.50	84.50	77.50	73.50
191	21	do	do	47	r. o. m.	thr. 1″	1.97	.98	60.92	92.13	50.00	50.00	93.50	85.50	79.50	75.00
192	21	do	do	43	r. o. m.	thr. $\frac{3}{4}''$	1.98	.96	59.70	91.52	49.00	51.00	91.50	87.00	81.50	77.50
	Tennessee:															
133	1	Mingo	Fork Ridge	49	r. o. m.	f. c.	1.96	1.00	62.14	92.70	51.00	49.00	95.00	91.00	87.00	81.50
153	1 (w.)	do	do	43	r. o. m.	f. c.	1.87	.88	54.41	87.48	47.00	53.00	90.00	78.00	71.00	66.00

127	2	Log Mountain	Gatliff	54	r. o. m.	f. c.	1.81	.91	56.12	87.33	50.00	50.00	87.00	72.00	59.00	49.50
128	3	Regal Block	do	42	r. o. m.	f. c.	1.87	.89	55.13	87.55	48.00	52.00	90.00	79.00	68.50	58.50
125	4	Windrock, or Dean.	Oliver Springs	60	r. o. m.	f. c.	1.93	.93	57.68	90.11	48.00	52.00	90.00	79.00	69.50	63.00
129	4	do	do	53	r. o. m.	f. c.	1.91	.95	58.41	89.61	50.00	50.00	87.00	78.00	63.00	56.50
154	5 (w.)	Brushy Mountain	Petros	49	r. o. m.	f. c.	1.91	.88	54.60	88.28	46.00	54.00	93.00	87.00	81.50	77.00
122	6	Lower Sewanee	Waldensia	43	r. o. m.	f. c.	1.95	.94	58.52	90.94	48.00	52.00	97.00	94.50	92.00	90.00
121	7 B	Wilder	Wilder	46	s.	f. c.	2.01	1.02	63.36	93.92	51.00	49.00	......	......	......	......
123	7 B (w.)	do	do	50	s.	f. c.	1.93	.84	52.08	87.02	44.00	56.00	98.00	95.00	92.50	91.50
134	8 B (w.)	First above Sewanee.	Clifty	45	([b])	f. c.	1.98	.84	52.24	88.39	42.00	58.00	95.00	91.00	87.00	82.00
124	9 (w.)	Sewanee	Coalmont	49	¾" s.	f. c.	1.93	.87	54.03	88.32	45.00	55.00	96.00	92.00	89.00	85.50
156	10 (w.)	Battle Creek	Orme	53	1" s.	f. c.	1.90	1.06	65.00	92.43	56.00	44.00	98.00	97.00	95.00	93.00
160	11 (w.)	(?)	Ozone	40	s.	f. c.	1.97	1.00	61.65	92.20	51.00	49.00	96.00	95.00	93.00	90.00
	Utah:															
130	1	(?)	Huntington Creek	49	r. o. m.	......	1.78	1.11	67.48	91.17	62.00	38.00	81.50	61.50	42.50	36.50
141	1[c]	(?)	do	60	r. o. m. and broken.	f. c.	......	......	......	......	......	......	......	......	......	......
157	1[d]	(?)	do	48	r. o. m. and broken.	f. c.	1.87	1.16	71.29	94.98	62.00	38.00	......	......	......	......
	Virginia:															
64	1*	Wilson	Crab Orchard	71	r. o. m.	f. c.	1.80	.93	57.11	87.06	52.00	48.00	95.50	90.50	85.50	80.50
65	1*	do	do	36	r. o. m.	f. c.	1.79	.91	56.65	87.21	51.00	49.00	92.50	85.00	78.50	74.50
67	1*	do	do	36	r. o. m.	......	1.83	.95	59.13	89.08	52.00	48.00	89.00	80.50	71.00	67.00
68	1*	do	do	67	r. o. m.	......	1.81	.94	58.06	88.01	52.00	48.00	91.00	80.00	72.00	67.00
77	1*	do	do	65	r. o. m.	f. c.	1.87	.84	52.27	86.56	45.00	55.00	93.00	89.00	82.00	78.00
63	2*	McConnell	do	51	r. o. m.	f. c.	1.87	.85	52.88	87.17	45.00	55.00	95.00	81.50	78.50	73.00
69	2*	do	do	48	r. o. m.	......	1.85	.93	57.23	88.43	50.00	50.00	88.50	81.00	73.50	68.00
70	2 (w.)*	do	do	40	r. o. m.	f. c.	1.87	.80	49.68	85.23	43.00	57.00	93.50	89.50	83.50	67.50
61	3*	Upper Banner	Toms Creek	45	l.	f. c.	1.93	1.25	77.72	99.67	65.00	35.00	92.00	85.00	78.50	75.00
88	3*	do	do	50	l.	......	1.87	1.12	69.30	94.26	60.00	40.00	93.50	89.00	83.50	80.50
62	4*	Darby	Darby	36	l.	f. c.	1.84	.83	51.70	85.99	45.00	55.00	93.50	87.00	82.50	77.00
181	6	No. 4	Richlands	50	r. o. m.	f. c.	2.00	.88	54.71	89.65	44.00	56.00	94.00	87.50	82.00	76.00
184	6 (w.)	do	do	48	r. o. m.	f. c.	2.01	.82	51.02	87.82	41.00	59.00	96.50	92.50	89.50	87.00
	Washington:															
135	2	(?)	Roslyn	36	l.	f. c.	1.90	.95	58.64	89.84	50.00	50.00	84.50	72.00	63.00	54.50
	West Virginia:															
40	4 B.*	Upper Freeport	Bretz	57	r. o. m.	f. c.	1.92	.88	54.71	88.39	46.00	54.00	98.50	96.50	94.50	92.50
44	4 B (w.)*	do	do	72	r. o. m.	f. c.	1.96	.97	60.12	91.33	50.00	50.00	95.00	93.00	91.00	88.50
46	4 B (w.)*	do	do	74	r. o. m.	f. c.	1.88	.87	54.10	87.78	46.00	54.00	97.50	96.00	93.50	90.50
21	13*	Austed	Page	84	r. o. m.	f. c.	1.84	1.02	63.13	91.21	55.00	45.00	......	......	......	......
23	13 and 14*	do	do	77	r. o. m.	f. c.	1.85	.88	54.67	87.10	48.00	52.00	96.00	90.50	87.00	84.50
20	14*	do	do	71	r. o. m.	f. c.	1.92	.85	52.81	87.74	44.00	56.00	95.50	90.50	88.50	87.00
36	15*	Pittsburg	Clarksburg	46	r. o. m.	f. c.	1.90	1.07	66.45	93.88	56.00	44.00	94.50	89.50	82.00	78.00
43	15*	do	do	73	r. o. m.	f. c.	1.93	1.13	70.29	95.86	59.00	41.00	95.50	91.00	87.00	85.50
73	16 A*	do	Monongah	60	¾" s.	f. c.	1.92	.87	53.91	88.20	45.00	55.00	94.50	89.00	80.00	79.50
45	16 B*	do	do	72		f. c.	1.95	.87	54.03	88.32	45.00	55.00	97.50	95.50	93.00	91.00

[a] With 5 per cent pitch.
[b] Over ¾-inch screen, with 18 per cent of slack returned to it.
[c] Mixed with one-third Rhode Island No. 1.
[d] Mixed with one-fourth Rhode Island No. 1.

Details of coking tests of coals, January 1, 1905, to June 30, 1907—Continued.

Test No.	Field No. of coal.	Origin of coal sample. Designation of bed.	Origin of coal sample. At or near—	Duration of test (hours).	Size of coal (see p. 4). As shipped.	Size of coal (see p. 4). As used.	Specific gravity. Real.	Specific gravity. Apparent.	Pounds per cubic foot. Dry.	Pounds per cubic foot. As received (wet).	Percentage by volume. Coke.	Percentage by volume. Cells.	6-foot drop test: Percentage over 2-inch mesh. 1.	2.	3.	4.
1	2	3	4	5	6	7	8	9	10	11	12	13	14	15	16	17
	West Virginia—Continued.															
48	16 B (w.)*	Pittsburg	Monongah	47	s.	f. c.	1.87	0.80	49.72	85.27	43.00	57.00	94.00	90.50	86.50	83.00
49	16 B (w.)*	do	do	25	s.	f. c.	1.84	.73	45.34	82.75	40.00	60.00	95.00	91.50	88.00	84.50
60	17 (w.)*	Bakerstown	Bretz	42	r. o. m.	f. c.	1.91	.93	57.95	89.76	49.00	51.00	96.50	93.50	90.50	88.00
74	18*	Glen Alum	Glen Alum	43	r. o. m.	......	1.93	.98	60.73	91.29	51.00	49.00	93.00	85.00	78.00	73.00
78	18*	do	do	48	r. o. m.	f. c.	1.87	.90	55.74	88.16	48.00	52.00	94.50	89.50	86.00	83.00
79	19*	Sewell	McDonald	49	r. o. m.	f. c.	1.98	.86	53.45	89.00	43.00	57.00	96.50	95.50	92.50	90.50
83	19*	do	do	53	r. o. m.	f. c.	1.94	.84	52.16	87.71	43.00	57.00	99.00	98.00	96.00	95.00
80	20*	Keystone	Acme	42	r. o. m.	f. c.	1.80	1.12	69.72	93.42	62.00	38.00	92.00	85.00	80.50	75.00
84	20 (w.)*	do	do	50	r. o. m.	f. c.	1.85	1.02	63.44	91.52	55.00	45.00	97.50	89.50	85.00	81.50
87	20 (w.)*	do	do	53	r. o. m.	......	1.90	1.01	62.87	92.16	53.00	47.00	94.50	88.50	83.50	78.50
92	20*	do	do	46	r. o. m.	f. c.	1.92	1.18	73.49	97.19	62.00	38.00	......	......	......	......
82	21*	Peerless	Winifrede	52	r. o. m.	f. c.	1.86	.89	55.46	87.82	48.00	52.00	92.50	87.50	82.00	77.00
91	21 (w.)*	do	do	44	r. o. m.	f. c.	1.87	.87	53.91	86.98	47.00	53.00	94.50	90.50	85.50	81.00
175	25	Black Band	Charleston	43	l.	f. c.	1.90	.97	60.31	90.87	51.00	49.00	87.50	79.50	73.50	69.50
	Wyoming:															
52	3 (w.)*	(?)	Aladdin	27	r. o. m.	f. c.	......	......	......	......	......	......	......	......	......	......
132	5	Rock Springs	Rock Springs	39	r. o. m.	f. c.	......	......	......	......	......	......	......	......	......	......

Details of coking tests of coals, January 1, 1905, to June 30, 1907—Continued.

Test No.	Field No. of coal.	Condition.[a]	Weight of coal (pounds).	Production (pounds). Coke.	Production (pounds). Breeze.	Production (per cent). Coke.	Production (per cent). Breeze.	Production (per cent). Total.	Chemical analysis of coal. Moisture.	Chemical analysis of coal. Volatile matter.	Chemical analysis of coal. Fixed carbon.	Chemical analysis of coal. Ash.	Chemical analysis of coal. Sulphur.	Chemical analysis of coke. Moisture.	Chemical analysis of coke. Volatile matter.	Chemical analysis of coke. Fixed carbon.	Chemical analysis of coke. Ash.	Chemical analysis of coke. Sulphur.	Chemical analysis of coke. Phosphorus.
1	2	18	19	20	21	22	23	24	25	26	27	28	29	30	31	32	33	34	35
	Alabama:																		
142	2 B (w.)	1	10,530	6,197	684	58.85	6.50	65.35	6.26	31.99	52.66	9.09	1.36	3.04	1.06	82.15	13.75	1.16	0.070
		2	9,871	6,009	663	60.88	6.72	67.60		34.12	56.18	9.70	1.45		1.09	84.73	14.18	1.20	
138	3	1	12,180	7,802	489	64.06	4.01	68.07	2.77	28.99	53.14	15.10	.62	2.03	1.80	74.89	21.28	.60	.0057
		2	11,841	7,644	479	64.54	4.04	68.58		29.82	54.65	15.53	.64		1.84	76.44	21.72	.61	
139	3 (w.)	1	11,660	7,072	258	60.65	2.21	62.86	6.36	30.54	53.10	10.00	.62	.99	1.06	83.51	14.44	.58	.0008
		2	10,918	7,002	255	64.13	2.34	66.47		32.61	56.71	10.68	.66		1.07	84.34	14.59	.59	
131	4	1	12,000	7,706	281	64.22	2.34	66.56	4.17	30.37	54.50	10.96	1.18	.29	.84	83.21	15.56	1.08	.0126
		2	11,500	7,684	280	66.82	2.44	69.26		31.69	56.87	11.44	1.23		.84	83.45	15.71	1.08	
136	4 (w.)	1	12,000	6,809	239	56.74	1.99	58.73	7.28	30.46	58.38	3.88	1.00	.35	.42	92.99	6.24	.87	.008
		2	11,126	6,785	238	60.98	2.14	63.12		32.85	62.97	4.18	1.08		.42	93.32	6.26	.87	
171	5	1	12,110	7,950	390	65.65	3.22	68.87	3.98	26.55	56.92	12.55	1.44	.59	.89	81.10	17.42	1.16	.0077
		2	11,628	7,903	388	67.97	3.34	71.31		27.65	59.28	13.07	1.50		.90	81.58	17.52	1.17	
172	6	1	12,100	8,350	316	69.01	2.61	71.62	3.28	25.30	64.50	6.92	.59	.46	.35	89.37	9.82	.59	.0512
		2	11,703	8,312	315	71.02	2.69	73.71		26.16	66.69	7.15	.61		.35	89.78	9.87	.59	
174	6 (w.)	1	11,880	7,800	221	65.66	1.86	67.52	6.73	24.84	63.57	4.86	.59	.63	.27	92.36	6.74	.60	.0377
		2	11,080	7,751	220	69.95	1.99	71.94		26.63	68.16	5.21	.63		.27	92.95	6.78	.60	
	Arkansas:																		
95	1 B (w.)	1	10,000	5,832	574	58.32	5.74	64.06	10.96	16.66	66.51	5.87	1.01	2.89	3.67	85.23	8.21	1.25	.006
		2	8,904	5,663	557	63.60	6.26	69.86		18.71	74.70	6.59	1.13		3.78	87.77	8.45	1.29	
96	1 B (w.)	1	10,000	5,806	1,290	58.06	12.90	70.96	6.77	15.04	69.32	8.87	1.14	1.31	2.44	84.53	11.72	1.11	.0135
		2	9,323	5,730	1,273	61.46	13.65	75.11		16.13	74.35	9.52	1.22		2.47	85.65	11.88	1.12	
97	1 B (w.)	1	10,000	6,055	214	60.55	2.14	62.69	7.80	18.93	64.92	8.35	1.08	2.74	1.29	85.81	10.16	1.02	
		2	9,220	5,889	208	63.87	2.26	66.13		20.53	70.41	9.06	1.17		1.33	88.23	10.44	1.05	
100	1 B (w.)	1	10,000	5,976	391	59.76	3.91	63.67	5.69	17.34	68.67	8.30	1.12	.18	2.03	87.26	10.55	1.07	
		2	9,431	5,965	390	63.25	4.14	67.39		18.39	72.81	8.80	1.19		2.03	87.42	10.55	1.07	
104	7 B (w.)	1	10,000	2,730	3,750	27.30	37.50	64.80	6.98	14.86	70.97	7.19	1.78	.13	.53	89.72	9.62	1.70	.0116
		2	9,302	2,726	3,745	29.31	40.26	69.57		15.98	76.29	7.73	1.91		.53	89.84	9.63	1.71	
105	7 B (w.)	1	10,000	4,868	1,604	48.68	16.04	64.72	7.52	16.66	68.85	6.97	1.65	.67	.85	89.14	9.34	1.60	.0082
		2	9,248	4,835	1,593	52.28	17.23	69.51		18.01	74.45	7.54	1.78		.86	89.74	9.40	1.61	
98	9 (w.)	1	10,000						7.43	13.84	65.55	13.18	.96						
		2	9,257							14.95	70.81	14.24	1.04						
101	9 (w.)	1	8,000						6.30	14.74	65.01	13.95	.98						
102	9 (w.)	1	10,000	6,252	458	62.52	4.58	67.10	5.60	17.22	64.03	13.15	1.01	.30	.81	81.48	17.41	1.07	.0329
		2	9,440	6,233	457	60.03	4.84	70.87		18.24	67.83	13.93	1.07		.81	81.73	17.46	1.07	
103	9 (w.)	1	10,000	5,107	1,693	51.07	16.93	68.00	5.76	14.84	66.63	12.77	1.02	.33	.80	83.70	15.17	1.07	.0293
		2	9,424	5,090	1,687	54.01	17.90	71.91		15.75	70.70	13.55	1.08		.80	83.98	15.22	1.07	

[a] Condition 1 means "as charged" with reference to weight of coal (column 19), and "as received" (wet) with reference to other items; condition 2 means "on dry basis."

Details of coking tests of coals, January 1, 1905, to June 30, 1907—Continued.

Test No.	Field No. of coal.	Condition.	Weight of coal (pounds).	Production (pounds). Coke.	Production (pounds). Breeze.	Production (per cent). Coke.	Production (per cent). Breeze.	Production (per cent). Total.	Chemical analysis of coal. Moisture.	Chemical analysis of coal. Volatile matter.	Chemical analysis of coal. Fixed carbon.	Chemical analysis of coal. Ash.	Chemical analysis of coal. Sulphur.	Chemical analysis of coke. Moisture.	Chemical analysis of coke. Volatile matter.	Chemical analysis of coke. Fixed carbon.	Chemical analysis of coke. Ash.	Chemical analysis of coke. Sulphur.	Chemical analysis of coke. Phosphorus.
1	2	18	19	20	21	22	23	24	25	26	27	28	29	30	31	32	33	34	35
	Georgia:																		
173	1	1	12,180	8,100	549	66.50	4.51	71.01	3.35	16.54	66.07	14.04	1.29	0.45	0.35	81.69	17.51	1.00	0.0113
		2	11,772	8,064	547	68.50	4.65	73.15	......	17.11	68.36	14.53	1.33	......	.35	82.06	17.59	1.00	......
	Illinois:																		
1	7 D	1	8,000	3,907	452	48.84	5.65	54.49	10.88	35.27	38.44	15.41	4.53	2.26	1.86	72.68	23.20	3.95	......
		2	7,130	3,819	442	53.57	6.20	59.77	......	39.58	43.13	17.29	5.08	......	1.90	74.36	23.74	4.04	......
4	7 D (w.)	1	10,000	5,200	260	52.00	2.60	54.60	12.45	36.17	42.08	9.30	3.64	1.04	.61	82.10	16.25	3.24	......
		2	8,755	5,146	257	58.78	2.94	61.72	......	41.32	48.06	10.62	4.16	......	.61	82.96	16.43	3.27	......
5	11 D (w.)	1	10,000	5,400	300	54.00	3.00	57.00	8.24	31.64	52.81	7.31	1.55	1.19	.93	85.97	11.91	1.44	.0065
		2	9,176	5,336	296	58.15	3.23	61.38	......	34.48	52.55	7.97	1.69	......	.93	87.01	12.06	1.46	......
2	13 (w.)	1	10,000	4,600	718	46.00	7.18	53.18	11.44	30.95	50.16	7.45	1.25	4.60	1.68	82.08	11.64	1.27	.007
		2	8,856	4,388	685	49.55	7.73	57.28	......	34.95	56.64	8.41	1.41	......	1.76	86.04	12.20	1.33	......
3	13	1	12,000	5,358	1,327	44.65	11.06	55.71	10.56	30.08	49.08	10.28	1.71	2.73	1.36	79.30	16.61	1.77	.0162
		2	10,733	5,212	1,291	48.56	12.03	60.59	......	33.63	54.87	11.50	1.91	......	1.40	81.53	17.07	1.82	......
10	16 (w.)	1	10,000	5,579	910	55.79	9.10	64.89	9.79	30.35	51.79	8.07	1.09	2.14	1.46	83.96	12.44	1.02	.0076
		2	9,021	5,460	891	60.53	9.88	70.41	......	33.64	57.41	8.95	1.21	......	1.49	85.80	12.71	1.04	......
106	20 (w.)	1	10,000	4,255	628	42.55	6.28	48.83	17.04	32.59	40.77	9.60	3.23	.57	.66	82.49	16.28	3.01	......
		2	8,296	4,231	524	51.00	6.32	57.32	......	39.28	49.15	11.57	3.89	......	.67	82.96	16.37	3.03	......
107	20 (w.)	1	10,000	4,659	398	46.59	3.98	50.57	14.36	34.61	42.63	8.40	3.23	.53	.29	84.87	14.31	2.72	......
		2	8,562	4,634	396	54.11	4.61	58.72	......	40.41	49.78	9.81	3.77	......	.29	85.32	14.39	2.73	......
126	21	1	12,000	......	......	......	......	......	13.37	31.17	43.15	12.31	1.46	......	......	......	......	......	......
137	21 (w.)	1	11,690	......	......	......	......	......	17.45	30.01	44.74	7.80	1.10	......	......	......	......	......	......
117	22 B	1	10,000	5,046	534	50.46	5.34	55.80	11.98	33.87	37.72	16.43	4.74	.98	.72	72.18	26.12	4.61	......
		2	8,802	4,997	529	56.77	6.01	62.78	......	38.48	42.85	18.67	5.39	......	.73	72.89	26.38	4.66	......
118	22 B (w.)	1	12,000	5,616	574	46.80	4.78	51.58	16.19	34.14	39.53	10.14	3.79	.65	1.60	80.76	16.99	3.65	......
		2	10,057	5,579	570	55.47	5.67	61.14	......	40.74	47.17	12.09	4.52	......	1.61	81.29	17.10	3.67	......
111	23 A (w.)	1	10,000	4,211	347	42.11	3.47	45.58	13.74	36.47	41.01	8.78	3.57	.66	.74	83.45	15.15	3.09	......
		2	8,626	4,183	345	48.49	4.00	52.49	......	42.28	47.54	10.18	4.14	......	.74	84.01	15.25	3.11	......
112	23 B (w.)	1	10,000	4,407	389	44.07	3.89	47.96	15.85	35.02	40.57	8.56	3.27	.96	1.14	82.66	15.24	2.87	......
		2	8,415	4,365	385	51.87	4.58	56.45	......	41.62	48.21	10.17	3.89	......	1.15	83.46	15.39	2.90	......
114	23 B (w.)	1	14,000	6,443	601	46.02	4.29	50.31	15.93	35.88	40.16	8.03	3.25	1.36	1.19	82.83	14.62	2.84	......
		2	11,770	6,355	593	53.99	5.04	59.03	......	42.68	47.77	9.55	3.87	......	1.21	83.97	14.82	2.88	......
119	24 A	1	10,000	......	......	......	......	......	13.28	29.93	39.03	17.76	4.05	......	......	......	......	......	......
155	24 A (w.)	1	11,410	......	......	......	......	......	15.18	32.13	43.46	9.23	3.07	......	......	......	......	......	......
145	24 B (w.)	1	11,830	4,710	1,350	39.81	11.41	51.22	8.93	35.22	46.29	9.56	3.41	5.62	1.64	79.01	13.73	2.97	......
		2	10,773	4,445	1,274	41.26	11.83	53.09	......	38.67	50.83	10.50	3.74	......	1.74	83.71	14.55	3.15	......
120	25	1	10,000	......	......	......	......	......	12.96	33.01	39.60	14.43	4.09	......	......	......	......	......	......
140	25 (w.)	1	11,830	5,355	710	45.27	6.00	51.27	13.40	33.83	43.66	9.11	2.99	2.71	4.67	77.69	14.93	2.32	......
		2	10,245	5,210	691	50.85	6.74	57.59	......	39.06	50.42	10.52	3.45	......	4.80	79.85	15.35	2.38	......

143	26 (w.)	1	11,750	5,850	1,250	49.79	10.64	60.43	15.18	33.46	41.53	9.83	2.73	5.27	3.35	75.98	15.40	2.80	....
		2	9,966	5,542	1,184	55.61	11.88	67.49	....	39.45	48.96	11.59	3.22	....	3.54	80.20	16.26	2.95	....
144	27 (w.)	1	11,550	5,067	405	43.87	3.51	47.38	16.39	34.26	41.57	7.78	3.22	3.51	1.55	81.14	13.80	3.40	....
		2	9,657	4,889	391	50.63	4.05	54.68	....	40.98	49.72	9.30	3.85	....	1.61	84.09	14.30	3.52	....
166	28 C (w.)	1	12,600	6,350	661	50.40	5.25	55.65	9.37	30.38	53.36	6.89	1.09	2.82	.60	86.12	10.46	.98	.0075
		2	11,419	6,171	642	54.04	5.62	59.66	....	33.52	58.88	7.60	1.20	....	.62	88.62	10.76	1.01	....
169	29 A (w.)	1	12,010	4,950	684	41.22	5.70	46.92	15.63	33.88	42.81	7.68	3.13	.72	.90	84.62	13.76	2.57	....
		2	10,133	4,914	679	48.50	6.70	55.20	....	40.16	50.74	9.10	3.71	....	.91	85.23	13.86	2.59	....
170	29 A (w.)	1	11,680	4,950	338	42.38	2.89	45.27	18.39	32.87	41.53	7.21	3.06	2.78	.74	83.35	13.13	2.49	....
		2	9,532	4,812	329	50.48	3.45	53.93	....	40.28	50.89	8.83	3.75	....	.76	85.73	13.51	2.56	....
190	34 B (w.)	1	12,980	6,523	316	50.25	2.43	52.68	9.91	33.33	50.65	6.11	1.75	.19	.35	87.91	11.55	1.48	.0205
		2	11,694	6,511	315	55.68	2.69	58.37	....	37.00	56.22	6.78	1.94	....	.35	88.08	11.57	1.48	....
	Indiana:																		
14	3 (w.)	1	10,000	....	....	....	....	....	13.53	34.83	43.10	8.54	3.50	....	....	....	....	....	....
6	4	1	10,000	5,010	536	50.10	5.36	55.46	14.30	29.48	40.96	15.26	2.60	6.31	1.60	68.35	23.74	2.80	....
		2	8,570	4,694	502	54.77	5.86	60.63	....	34.40	47.79	17.81	3.03	....	1.71	72.95	25.34	2.99	....
9	4 (w.)	1	10,000	5,153	332	51.53	3.32	54.85	16.33	31.89	44.19	7.59	2.08	.55	.38	85.91	13.16	2.06	....
		2	8,367	5,125	330	61.25	3.94	65.19	....	38.11	52.82	9.07	2.49	....	.38	86.39	13.23	2.07	....
8	5 (w.)	1	10,000	5,340	232	53.40	2.32	55.72	10.74	36.71	41.95	10.60	4.61	.76	.54	81.29	17.41	4.21	....
		2	8,926	5,299	230	59.37	2.58	61.95	....	41.13	47.00	11.87	5.16	....	.55	81.91	17.54	4.24	....
12	6 (w.)	1	10,000	5,434	501	54.34	5.01	59.35	12.39	36.77	40.85	9.99	3.59	.75	.73	81.90	16.62	3.16	....
		2	8,761	5,393	497	61.56	5.67	67.23	....	41.97	46.63	11.40	4.10	....	.73	82.52	16.75	3.18	....
13	7 A (w.)	1	12,240	6,993	640	57.13	5.23	62.36	10.33	38.35	42.93	8.39	3.12	1.13	2.35	83.23	13.29	2.69	....
		2	10,976	6,914	633	62.99	5.77	68.76	....	42.77	47.87	9.36	3.48	....	2.38	84.18	13.44	2.72	....
16	9 A	1	12,000	7,034	455	58.62	3.79	62.41	12.30	34.96	41.62	11.12	3.41	.81	2.00	78.74	18.45	3.41	....
		2	10,524	6,977	451	66.30	4.29	70.59	....	39.86	47.46	12.68	3.89	....	2.02	79.36	18.60	3.44	....
17	9 B	1	12,000	7,006	464	58.38	3.87	62.25	12.51	35.65	40.48	11.36	3.26	.68	2.85	78.44	18.03	3.50	....
		2	10,499	6,958	461	66.27	4.39	70.66	....	40.75	46.27	12.98	3.73	....	2.87	78.98	18.15	3.52	....
18	9 B (w.)	1	12,000	6,915	442	57.63	3.68	61.31	14.14	36.70	40.90	8.26	2.61	.91	.97	84.60	13.52	2.24	....
		2	10,303	6,852	438	66.50	4.25	70.75	....	42.74	47.64	9.62	3.04	....	.98	85.38	13.64	2.26	....
51	11 D	1	12,000	6,600	460	55.00	3.83	58.83	11.90	32.50	46.94	8.66	1.53	1.55	1.66	84.09	12.70	1.34	.0424
		2	10,572	6,498	453	61.46	4.28	65.74	....	36.89	53.28	9.83	1.74	....	1.69	85.41	12.90	1.36	....
108	12	1	10,000	5,258	464	52.58	4.64	57.22	11.77	33.78	40.00	14.45	4.32	.88	.62	75.95	22.55	3.84	....
		2	8,823	5,212	460	59.07	5.21	64.28	....	38.29	45.33	16.38	4.90	....	.63	76.62	22.75	3.87	....
109	12 (w.)	1	10,000	5,304	255	53.04	2.55	55.59	13.79	35.43	42.75	8.03	3.22	.60	1.15	84.32	13.93	2.86	....
		2	8,621	5,272	253	61.15	2.93	64.08	....	41.10	49.59	9.31	3.73	....	1.16	84.83	14.01	2.88	....
110	12 (w.)	1	12,000	6,355	296	52.96	2.47	55.43	12.82	37.25	41.52	8.41	3.33	.42	1.03	84.37	14.18	2.89	....
		2	10,462	6,328	295	60.49	2.82	63.31	....	42.73	47.63	9.64	3.82	....	1.03	84.73	14.24	2.90	....
163	17 (w.)	1	12,050	7,200	332	59.75	2.76	62.51	10.57	35.65	43.77	10.01	3.76	1.65	.67	81.42	16.26	3.39	....
		2	10,776	7,081	327	65.71	3.03	68.74	....	39.86	48.95	11.19	4.20	....	.68	82.79	16.53	3.45	....
158	18 A (w.)	1	11,800	....	....	....	....	....	15.09	31.06	46.42	7.43	1.48	....	....	....	....	....	....
168	18 A (w.)	1	12,740	....	....	....	....	....	13.97	30.97	48.07	6.99	1.49	....	....	....	....	....	....
	Kansas:																		
113	6	1	10,000	5,443	341	54.43	3.41	57.84	8.58	30.27	45.92	15.23	3.47	1.01	.64	75.07	23.28	3.45	....
		2	9,142	5,388	338	58.94	3.71	62.65	....	33.11	50.23	16.66	3.80	....	.64	75.84	23.52	3.49	....
115	6 (w.)	1	12,000	6,439	299	53.66	2.49	56.15	12.29	30.30	47.21	10.20	2.63	.59	.56	82.78	16.07	2.49	....
		2	10,525	6,401	297	60.82	2.82	63.64	....	34.55	53.82	11.63	3.00	....	.56	83.27	16.17	2.50	....
	Kentucky:																		
76	1 B	1	12,000	8,026	257	66.88	2.14	69.02	3.55	35.49	55.88	5.08	1.17	.93	1.25	91.40	6.42	1.05	.0300
		2	11,574	7,951	255	68.70	2.20	70.90	....	36.79	57.94	5.27	1.21	....	1.26	92.26	6.48	1.06	....

Details of coking tests of coals, January 1, 1905, to June 30, 1907—Continued.

Test No.	Field No. of coal.	Condition.	Weight of coal (pounds).	Production (pounds). Coke.	Production (pounds). Breeze.	Production (per cent). Coke.	Production (per cent). Breeze.	Production (per cent). Total.	Chemical analysis of coal. Moisture.	Chemical analysis of coal. Volatile matter.	Chemical analysis of coal. Fixed carbon.	Chemical analysis of coal. Ash.	Chemical analysis of coal. Sulphur.	Chemical analysis of coke. Moisture.	Chemical analysis of coke. Volatile matter.	Chemical analysis of coke. Fixed carbon.	Chemical analysis of coke. Ash.	Chemical analysis of coke. Sulphur.	Chemical analysis of coke. Phosphorus.
1	2	18	19	20	21	22	23	24	25	26	27	28	29	30	31	32	33	34	35
	Kentucky—Cont'd.																		
71	16 C	1	12,000	7,319	355	60.99	2.96	63.95	5.64	32.41	52.77	9.18	1.11	1.32	1.53	84.68	12.47	0.96	0.0435
		2	11,323	7,222	350	63.78	3.09	66.87		34.35	55.92	9.73	1.18		1.55	85.81	12.64	.97	
75	5	1	12,000	7,993	256	66.61	2.13	68.74	4.67	35.33	56.30	3.70	.45	.30	1.21	93.26	5.23	.41	.0115
		2	11,440	7,969	255	69.66	2.23	71.89		37.06	59.06	3.88	.47		1.21	93.54	5.25	.41	
86	6	1	12,000	6,780	587	56.50	4.89	61.39	5.21	36.82	55.62	2.35	.51	2.81	1.27	91.93	3.99	.40	.0021
		2	11,375	6,589	571	57.93	5.02	62.95		38.84	58.68	2.48	.54		1.31	94.59	4.10	.41	
90	6	1	12,000	6,659	447	55.49	3.73	59.22	5.42	36.82	55.30	2.46	.48	1.64	1.69	92.26	4.41	.37	.0033
		2	11,350	6,550	440	57.71	3.88	61.59		38.93	58.47	2.60	.51		1.72	93.80	4.48	.38	
85	7	1	12,000	6,865	342	57.21	2.85	60.06	8.82	35.03	46.78	9.37	3.56	.23	2.16	82.97	14.64	3.16	
		2	10,942	6,849	341	62.59	3.12	65.71		38.42	51.30	10.28	3.90		2.17	83.16	14.67	3.17	
164	8	1	12,450	7,200	371	57.83	2.98	60.81	4.97	30.87	56.66	7.50	1.23	.50	.65	87.96	10.89	.93	.0091
		2	11,831	7,164	369	60.55	3.12	63.67		32.49	59.62	7.89	1.29		.65	88.40	10.95	.93	
165	8	1	12,840	7,845	361	61.10	2.81	63.91	5.49	30.36	55.49	8.66	1.27	.47	.50	86.10	12.93	1.14	.0120
		2	12,135	7,808	359	64.34	2.96	67.30		32.12	58.72	9.16	1.34		.50	86.51	12.99	1.15	
167	9 A (w.)	1	12,190	6,360	309	52.17	2.54	54.71	9.12	35.42	47.88	7.58	2.58	1.01	.69	86.46	11.84	1.96	
		2	11,078	6,296	306	56.83	2.76	59.59		39.97	52.68	8.35	2.84		.70	87.34	11.96	1.98	
	Maryland:																		
50	1	1	8,000						2.24	13.77	71.04	12.95	1.39						
54	1 (w.)	1	8,000						5.37	14.23	70.54	9.86	1.04						
58	1 (w.)	1	8,000	4,650	565	58.13	7.06	65.19	4.35	17.81	68.86	8.98	1.09	.27	.88	87.47	11.38	.95	.0278
		2	7,652	4,616	561	60.32	7.33	67.65		18.62	71.99	9.39	1.14		.88	87.71	11.41	.95	
	Missouri:																		
116	5 (w.)	1	10,000	4,903	299	49.03	2.99	52.02	13.68	34.82	42.26	9.24	3.60	1.12	.73	82.64	15.51	3.40	
		2	8,632	4,848	296	56.16	3.43	59.59		40.34	48.96	10.70	4.17		.74	83.58	15.68	3.44	
	New Mexico:																		
148	3 B	1	12,120	7,655	410	63.16	3.38	66.54	3.68	33.06	48.94	14.32	.78	.76	.67	78.14	20.43	.71	.0000
		2	11,674	7,597	407	65.08	3.49	68.57		34.32	50.81	14.81	.81		.67	78.74	20.59	.71	
149	3 B (w.)	1	11,710	7,233	360	61.77	3.07	64.84	5.74	33.02	48.99	12.25	.72	.88	1.51	80.42	17.19	.65	.0042
		2	11,038	7,169	357	64.95	3.23	68.18		35.03	51.97	13.00	.77		1.52	81.14	17.34	.66	
152	3 B, 4 B, 5 (w.)	1	12,000	7,596	328	63.30	2.73	66.03	5.13	33.88	50.06	10.93	.69	.69	1.48	82.18	15.65	.63	.0348
		2	11,384	7,544	326	66.27	2.86	69.13		35.71	52.77	11.52	.73		1.49	82.75	15.76	.63	
150	4 B	1	11,790	7,610	362	64.55	3.07	67.62	3.69	34.62	47.83	13.86	.66	1.10	.94	78.48	19.48	.58	.1004
		2	11,355	7,526	358	66.28	3.15	69.43		35.95	49.66	14.39	.69		.95	79.35	19.70	.59	
151	4 B (w.)	1	11,430	6,986	307	61.12	2.69	63.81	5.52	35.29	49.87	9.32	.67	1.39	.85	83.66	14.10	.60	.0946
		2	10,799	6,889	303	63.79	2.80	66.59		37.35	52.78	9.87	.71		.86	84.84	14.30	.61	
146	5	1	11,810	7,500	320	63.51	2.71	66.22	3.05	31.96	49.71	15.28	.76	1.04	1.44	76.93	20.59	86	.0003
		2	11,450	7,422	317	64.82	2.77	67.59		32.97	51.27	15.76	.78		1.46	77.74	20.80	.87	
147	5	1	11,770	7,650	280	65.00	2.38	67.38	4.23	32.25	51.79	11.73	.89	.99	.84	81.38	16.79	.76	.0001
		2	11,272	7,574	277	67.19	2.46	69.65		33.67	54.08	12.25	.93		.85	82.19	16.96	.77	

	Ohio:																		
24	1 (w.)	1	10,000	5,708	589	57.08	5.89	62.97	8.67	38.81	44.02	8.50	3.70	1.30	1.95	82.98	13.77	3.30	.0166
		2	9,133	5,634	581	61.69	6.36	68.05		42.49	48.20	9.31	4.05		1.98	84.07	13.95	3.34	
27	2 (w.)	1	10,000	4,980	690	49.80	6.90	56.70	10.38	37.30	45.04	7.28	3.07	3.55	2.27	82.52	11.66	2.84	
		2	8,962	4,803	666	53.59	7.43	61.02		41.62	50.26	8.12	3.43		2.35	85.56	12.09	2.94	
31	3 (w.)	1	8,000						12.68	32.55	47.98	6.79	1.24						
28	4	1	10,000	6,770	332	67.70	3.32	71.02	3.86	37.09	49.38	9.67	3.60	5.33	1.28	79.79	13.60	2.87	
		2	9,614	6,397	314	66.54	3.27	69.81		38.58	51.36	10.06	3.74		1.35	84.29	14.36	3.03	
22	5	1	10,000	6,383	358	63.83	3.58	67.41	4.49	34.57	52.85	8.09	1.77	.87	.98	86.15	12.00	1.64	.0087
		2	9,551	6,327	355	66.24	3.72	69.96		36.20	55.33	8.47	1.85		.99	86.91	12.10	1.65	
59	6	1	12,000	7,200	370	60.00	3.08	63.08	5.26	37.36	47.53	9.85	3.49	.77	1.26	83.71	14.26	2.96	
		2	11,369	7,145	367	62.85	3.23	66.08		39.43	50.17	10.40	3.68		1.27	84.36	14.37	2.98	
66	6 (w.)	1	12,000	7,166	369	59.72	3.08	62.80	5.53	36.95	50.96	6.56	2.96	.42	1.20	88.35	10.03	2.51	.0045
		2	11,336	7,136	367	62.94	3.24	66.18		39.11	53.95	6.94	3.13		1.21	88.72	10.07	2.52	
89	7	1	12,000	7,117	374	59.31	3.12	62.43	5.77	35.43	49.82	8.98	2.88	.75	.98	85.33	12.94	2.32	
		2	11,308	7,064	371	62.47	3.28	65.75		37.60	52.87	9.53	3.06		.99	85.97	13.04	2.34	
94	7 (w.)	1	12,000	6,898	303	57.48	2.53	60.01	7.37	36.36	49.72	6.55	2.23	.57	1.58	88.08	9.77	1.90	.0058
		2	11,116	6,859	301	61.70	2.71	64.41		39.25	53.68	7.07	2.41		1.59	88.58	9.83	1.91	
81	8	1	12,000	6,526	454	54.38	3.78	58.16	8.43	37.25	44.56	9.76	2.90	.66	.93	82.81	15.60	2.59	
		2	10,988	6,483	451	59.00	4.10	63.10		40.68	48.66	10.66	3.17		.94	83.36	15.70	2.61	
93	8 (w.)	1	12,000	6,281	433	52.34	3.61	55.95	11.43	37.90	44.64	6.03	2.10	2.46	1.76	86.05	9.73	1.88	
		2	10,628	6,126	422	57.64	3.97	61.61		42.80	50.40	6.80	2.37		1.80	88.22	9.98	1.93	
72	9 A	1	12,000	6,596	452	54.97	3.77	58.74	5.58	39.80	46.44	8.18	3.63	1.80	1.08	84.43	12.69	3.06	
		2	11,330	6,477	444	57.17	3.92	61.09		42.15	49.19	8.66	3.84		1.10	85.98	12.92	3.12	
55	9 B	1	12,000	6,647	595	55.39	4.96	60.35	9.03	33.56	41.10	16.31	3.40	.70	1.35	78.63	19.32	2.94	
		2	10,916	6,600	591	60.46	5.41	65.87		36.89	45.18	17.93	3.74		1.36	79.18	19.46	2.96	
57	9 B (w.)	1	12,000	6,300	441	52.50	3.68	56.18	9.73	37.27	46.02	6.98	2.84	.68	.89	86.93	11.50	2.40	
		2	10,832	6,257	438	57.76	4.04	61.80		41.29	50.98	7.73	3.15		.89	87.53	11.58	2.42	
180	12 (w.)	1	9,270	5,190	223	55.99	2.41	58.40	6.19	39.04	48.36	6.41	3.63	.73	.51	87.96	10.80	3.08	
		2	8,696	5,152	221	59.25	2.54	61.79		41.62	51.55	6.83	3.87		.51	88.61	10.88	3.10	
	Pennsylvania:																		
25	5	1	12,000	7,433	319	61.94	2.66	64.60	2.44	34.28	56.76	6.52	.97	.49	.90	88.03	10.58	.79	.0123
		2	11,707	7,397	317	63.18	2.71	65.89		35.14	58.18	6.68	.99		.91	88.46	10.63	.79	
26	5 (w.)	1	13,000	8,598	242	66.14	1.86	68.00	4.73	34.29	56.27	4.71	.94	.23	1.19	91.63	6.95	.81	.0053
		2	12,385	8,578	241	69.26	1.95	71.21		35.99	59.07	4.94	.99		1.19	91.84	6.97	.81	
32	6	1	10,000	7,330	315	73.30	3.15	76.45	3.22	31.52	51.87	13.39	2.10	.34	.71	82.31	16.64	1.59	.0241
		2	9,678	7,305	314	75.48	3.24	78.72		32.57	53.60	13.83	2.17		.71	82.59	16.70	1.60	
34	6 (w.)	1	10,000	6,905	246	69.05	2.46	71.51	6.58	33.00	52.96	7.46	1.46	.24	.66	88.61	10.49	1.21	.0162
		2	9,342	6,888	245	73.73	2.62	76.35		35.32	56.69	7.99	1.56		.66	88.82	10.52	1.21	
35	6	1	12,000	8,646	295	72.05	2.46	74.51	3.64	32.01	51.03	13.32	1.93	.48	1.62	81.20	16.76	1.70	.0229
		2	11,563	8,604	294	74.41	2.54	76.95		33.22	52.96	13.82	2.00		1.63	81.59	16.78	1.71	
38	6 (w.)	1	13,000	8,927	373	68.67	2.87	71.54	4.21	33.40	55.21	7.18	1.51	.89	2.26	86.77	10.08	1.24	.0153
		2	12,453	8,848	370	71.05	2.97	74.02		34.87	57.64	7.49	1.58		2.28	87.55	10.17	1.25	
41	6	1	12,000	8,743	364	72.86	3.03	75.89	2.53	32.09	53.21	12.17	1.78	.27	1.26	82.66	15.81	1.52	.0187
		2	11,696	8,719	363	74.55	3.10	77.65		32.92	54.59	12.49	1.83		1.27	82.88	15.85	1.52	
30	7	1	12,000	8,750	325	72.92	2.71	75.63	3.75	21.89	62.04	12.32	2.33	.46	1.16	82.39	15.99	1.87	.0366
		2	11,550	8,698	323	75.31	2.80	78.11		22.74	64.46	12.80	2.42		1.17	82.77	16.06	1.88	
33	7 (w.)	1	12,000	8,400	509	70.00	4.24	74.24	3.98	23.32	60.75	11.95	1.64	.43	1.84	83.40	14.33	1.42	.0369
		2	11,522	8,364	507	72.59	4.40	76.99		24.29	63.27	12.44	1.71		1.85	83.76	14.39	1.43	
29	8	1	10,000	5,223	1,600	52.23	16.00	68.23	3.32	15.56	74.29	6.83	1.12	.91	2.16	88.99	7.94	.91	.0049
		2	9,668	5,175	1,585	53.53	16.39	69.92		16.09	76.85	7.06	1.16		2.18	89.81	8.01	.92	

Details of coking tests of coals, January 1, 1905, to June 30, 1907—Continued.

Test No.	Field No. of coal.	Condition.	Weight of coal (pounds).	Production (pounds).		Production (per cent).			Chemical analysis of coal.					Chemical analysis of coke.					
				Coke.	Breeze.	Coke.	Breeze.	Total.	Moisture.	Volatile matter.	Fixed carbon.	Ash.	Sulphur.	Moisture.	Volatile matter.	Fixed carbon.	Ash.	Sulphur.	Phosphorus.
1	2	18	19	20	21	22	23	24	25	26	27	28	29	30	31	32	33	34	35
	Pennsylvania—Con.																		
37	9	1	7,000						3.26	16.18	69.44	11.12	1.90						
39	9	1	8,000						2.86	16.24	68.60	12.30	2.14						
42	9 (w.)	1	8,000	5,600	801	70.00	10.01	80.01	4.55	17.59	68.80	9.06	1.39	0.54	1.21	86.84	11.41	1.06	0.0101
		2	7,636	5,570	797	72.94	10.44	83.38		18.43	72.08	9.49	1.46		1.22	87.31	11.47	1.07	
56	9	1	8,000	5,300	495	66.25	6.19	72.44	2.60	17.92	69.36	10.12	1.80	.72	.61	86.02	12.65	1.53	.0070
		2	7,792	5,262	491	67.53	6.30	73.83		18.40	71.21	10.39	1.85		.62	86.64	12.74	1.54	
47	10	1	12,000	7,400	340	61.67	2.83	64.50	2.56	34.80	56.81	5.83	1.25	.39	1.14	90.40	8.07	1.00	.0081
		2	11,693	7,371	339	63.04	2.90	65.94		35.71	58.31	5.98	1.28		1.15	90.75	8.10	1.00	
53	10	1	12,000	8,322	268	69.35	2.23	71.58	2.73	35.41	55.58	6.28	1.36	.36	1.14	89.93	8.57	1.05	.0081
		2	11,672	8,301	267	71.12	2.29	73.41		36.40	57.14	6.46	1.40		1.15	90.25	8.60	1.05	
159	11	1	12,040	8,100	296	67.28	2.46	69.74	2.20	33.18	55.46	9.16	1.36	.52	.97	85.02	13.49	1.19	.0307
		2	11,775	8,058	294	68.43	2.50	70.93		33.93	56.71	9.36	1.39		.98	85.46	13.56	1.20	
161	12	1	11,950	7,885	286	65.98	2.39	68.37	2.46	31.28	56.70	9.56	2.03	.69	.29	86.29	12.73	1.66	.0184
		2	11,656	7,831	284	67.18	2.44	69.62		32.07	58.13	9.80	2.08		.29	86.89	12.82	1.67	
162	12 (w.)	1	12,140	8,100	257	66.72	2.12	68.84	4.50	31.35	57.66	6.49	1.40	.52	1.28	89.13	9.07	1.11	.0087
		2	11,594	8,058	256	69.50	2.21	71.71		32.83	60.38	6.79	1.47		1.29	89.59	9.12	1.12	
185	15 (w.)	1	9,750	5,779	262	59.27	2.69	61.96	7.19	17.86	69.57	5.38	1.63	.56	.32	91.10	8.02	1.46	.0064
		2	9,049	5,747	261	63.51	2.88	66.39		19.24	74.96	5.80	1.76		.32	91.61	8.07	1.47	
188	15 (w.)	1	12,460	8,144	332	65.36	2.66	68.02	4.53	18.56	70.63	6.28	1.85	.57	.55	90.23	8.65	1.54	.0050
		2	11,896	8,096	330	68.06	2.78	70.84		19.44	73.98	6.58	1.94		.55	90.75	8.70	1.55	
178	17	1	12,200	7,923	356	64.94	2.92	67.86	4.41	28.83	57.86	8.90	1.39	.22	.36	84.55	14.87	1.37	.0547
		2	11,662	7,906	355	67.79	3.04	70.83		30.16	60.53	9.31	1.45		.36	84.74	14.90	1.37	
186	17 (w.)	1	11,920	7,523	307	63.11	2.58	65.69	6.30	28.24	57.22	8.24	1.19	.29	.56	87.96	11.19	1.00	.0582
		2	11,169	7,501	306	67.16	2.74	69.90		30.14	61.07	8.79	1.27		.56	88.22	11.22	1.00	
176	19	1	12,110	7,800	315	64.41	2.60	67.01	3.01	30.66	57.17	9.16	1.16	.24	.19	88.06	11.51	.95	.0147
		2	11,745	7,781	314	66.25	2.67	68.92		31.61	58.94	9.45	1.20		.19	88.27	11.54	.95	
177	19	1	12,100	8,490	336	70.17	2.78	72.95	3.57	29.56	59.17	7.70	.98	.13	.49	87.45	11.93	.83	.0153
		2	11,668	8,479	336	72.67	2.88	75.55		30.65	61.36	7.99	1.02		.49	87.56	11.95	.83	
179	20	1	13,070	8,129	420	62.20	3.21	65.41	3.91	16.35	68.30	11.44	2.78	.30	.28	84.95	14.47	2.31	.0092
		2	12,559	8,105	419	64.54	3.34	67.88		17.01	71.08	11.91	2.89		.28	85.21	14.51	2.33	
182	20 (w.)	1	11,760	7,350	529	62.50	4.50	67.00	6.30	17.04	69.58	7.08	1.34	.51	.58	89.85	9.06	1.11	.0083
		2	11,019	7,313	526	66.37	4.77	71.14		18.18	74.26	7.56	1.43		.58	90.31	9.11	1.12	
183	21	1	15,140	10,200	401	67.37	2.65	70.02	5.37	28.33	58.07	8.23	.89	.71	.12	88.24	10.93	.82	.0164
		2	14,327	10,126	398	70.63	2.78	73.41		29.94	61.37	8.69	.94		.12	88.87	11.01	.83	
187	21	1	14,360	9,982	326	69.51	2.27	71.78	5.53	27.97	57.81	8.69	.86	.63	.66	87.78	10.93	.82	.0115
		2	13,566	9,919	324	73.12	2.39	75.51		29.61	61.19	9.20	.91		.66	88.34	11.00	.83	
189	21	1	12,450	8,457	319	67.93	2.56	70.49	4.05	29.26	58.29	8.40	.93	.82	.21	88.22	10.75	.81	.0099
		2	11,946	8,388	316	70.22	2.65	72.87		30.49	60.76	8.75	.97		.21	88.95	10.84	.82	

191	21	1	11,940	7,963	368	66.69	3.08	69.77	4.28	29.92	58.22	7.58	.91	.33	.15	88.54	10.98	.87	.0104
		2	11,429	7,937	367	69.45	3.21	72.66		31.26	60.82	7.92	.95		.15	88.83	11.02	.87	
192	21	1	11,500	7,733	339	67.24	2.95	70.19	3.58	28.86	60.13	7.43	.91	.29	.69	88.54	10.48	.76	.0095
		2	11,088	7,711	338	69.54	3.05	72.59		39.93	62.36	7.71	.94		.69	88.80	10.51	.76	
	Tennessee:																		
133	1	1	12,000	7,720	347	64.33	2.89	67.22	3.71	32.81	51.69	11.79	1.58	.37	.73	83.00	15.90	1.35	.0238
		2	11,555	7,691	346	66.56	2.99	68.55		34.07	53.68	12.25	1.64		.73	83.31	15.96	1.36	
153	1 (w.)	1	11,900	7,270	273	61.09	2.29	63.38	4.86	35.06	54.72	5.36	1.17	.93	.77	89.61	8.69	.93	.0253
		2	11,322	7,202	270	63.61	2.38	65.99		36.85	57.52	5.63	1.23		.78	90.45	8.77	.94	
127	2	1	12,000	7,213	343	60.11	2.86	62.97	3.56	36.53	55.32	4.59	.95	1.13	.64	91.00	7.23	.78	.0094
		2	11,573	7,131	339	61.62	2.93	64.55		37.88	57.36	4.76	.99		.65	92.04	7.31	.79	
128	3	1	11,280	7,136	394	63.26	3.49	66.75	4.32	33.90	55.56	6.22	1.05	.67	.81	87.44	11.08	.88	.0125
		2	10,793	7,088	391	65.67	3.62	69.29		35.43	58.07	6.50	1.10		.81	88.03	11.15	.89	
125	4	1	12,000	7,471	313	62.26	2.61	64.87	3.82	33.17	53.17	9.84	.89	.54	1.56	84.27	13.63	.72	.0215
		2	11,542	7,431	311	64.38	2.69	67.07		34.49	55.28	10.23	.93		1.57	84.73	13.70	.72	
129	4	a 1	11,270	7,500	266	66.55	2.36	68.91	3.82	33.17	53.17	9.84	.89	1.43	.28	86.73	11.56	.69	.0233
		2	10,839	7,393	262	68.21	2.42	70.63		34.49	55.28	10.23	.93		.28	87.98	11.74	.70	
154	5 (w.)	1	11,570	6,807	254	58.83	2.20	61.03	5.53	35.06	53.28	6.13	2.44	.56	.42	90.46	8.56	2.08	
		2	10,930	6,769	253	61.93	2.32	64.25		37.11	56.40	6.49	2.58		.42	90.97	8.61	2.09	
122	6	1	12,000	7,712	314	64.27	2.62	66.89	2.05	27.36	55.12	15.47	.90	.22	.91	79.01	19.86	.69	.0834
		2	11,754	7,695	313	65.47	2.66	68.13		27.93	56.28	15.79	.92		.92	79.18	19.90	.69	
121	7 B	1	12,000	6,680	716	55.67	5.97	61.64	7.88	28.28	46.43	17.41	3.43	.43	.36	74.43	24.78	2.98	
		2	11,054	6,651	713	60.17	6.45	66.62		30.70	50.40	18.90	3.72		.36	74.75	24.89	2.99	
123	7 B (w.)	1	12,000	6,911	323	57.59	2.69	60.28	8.37	32.29	49.02	10.32	2.21	.57	.87	83.59	14.97	1.77	.0468
		2	11,000	6,871	321	62.46	2.92	65.38		35.24	53.50	11.26	2.41		.87	84.07	15.06	1.78	
134	8 B (w.)	1	12,000	6,870	320	57.25	2.67	59.92	3.09	35.32	51.70	9.89	2.95	.32	.11	85.66	13.91	2.45	
		2	11,629	6,848	319	58.89	2.74	61.63		36.45	53.35	10.20	3.04		.12	85.93	13.95	2.46	
124	9 (w.)	1	12,000	7,948	283	66.23	2.36	68.59	4.02	27.79	58.28	9.91	.85	.39	.39	85.78	13.44	.61	.0968
		2	11,518	7,917	282	68.73	2.45	71.18		28.95	60.72	10.33	.89		.39	86.12	13.49	.61	
156	10 (w.)	1	11,690	6,900	757	59.02	6.48	65.50	7.80	29.29	49.32	13.59	1.05	1.67	.81	77.81	19.71	.95	.0390
		2	10,778	6,785	744	62.95	6.90	69.85		31.77	53.49	14.74	1.14		.82	79.13	20.05	.97	
160	11 (w.)	1	11,890	7,650	550	64.34	4.63	68.97	5.29	23.61	56.58	14.52	.86	1.14	1.60	80.14	17.12	.69	.0683
		2	11,261	7,563	544	67.16	4.83	71.99		24.93	59.74	15.33	.91		1.62	81.06	17.32	.70	
	Utah:																		
130	1	1	11,810	5,550	1,418	46.99	12.01	59.00	5.83	41.89	47.44	4.84	.56	2.53	1.37	88.06	8.04	.64	.0005
		2	11,121	5,410	1,382	48.65	12.43	61.08		44.48	50.38	5.14	.59		1.40	90.35	8.25	.66	
141	1	1	12,000						4.08	28.43	57.52	9.97	.45						
157	1	1	12,000	3,504	3,208	29.20	26.73	55.93	4.60	35.38	53.07	6.95	.46	1.50	1.38	86.07	11.05	.57	.0041
		2	11,448	3,451	3,160	30.15	27.60	57.75		37.09	55.63	7.28	.48		1.40	87.38	11.22	.58	
	Virginia:																		
64	1	1	14,000	9,079	415	64.85	2.96	67.81	5.70	32.52	56.15	5.63	.98	1.52	.99	89.20	8.29	.88	.0036
		2	13,202	8,941	409	67.72	3.09	70.81		34.49	59.54	5.97	1.04		1.01	90.58	8.41	.89	
65	1	1	10,000	6,811	258	68.11	2.58	70.69	4.44	33.44	56.27	5.85	1.13	1.23	1.67	89.24	7.86	.94	.0041
		2	9,556	6,727	255	70.40	2.67	73.07		34.99	58.89	6.12	1.18		1.69	90.35	7.96	.95	
67	1	1	10,000	5,879	424	58.79	4.24	63.03	4.95	34.21	55.86	4.98	1.12	.21	.89	90.99	7.91	1.01	
		2	9,505	5,867	423	61.73	4.45	66.18		35.99	58.77	5.24	1.18		.89	91.18	7.93	1.01	
68	1	1	14,000	8,596	590	61.40	4.21	65.61	4.82	33.21	56.95	5.02	1.10	.30	1.16	90.85	7.69	.97	
		2	13,325	8,570	588	64.32	4.41	68.73		34.89	59.83	5.28	1.16		1.17	91.12	7.71	.97	
77	1	1	14,000	9,506	314	67.90	2.24	70.14	4.40	35.09	55.24	5.27	1.05	.20	.80	91.52	7.48	1.02	.0046
		2	13,385	9,487	313	70.88	2.34	73.22		36.71	57.78	5.51	1.10		.80	91.70	7.50	1.02	

[a] Laboratory sample showed air-drying gain and was thrown out, analysis of sample for test 125 being substituted.

Details of coking tests of coals, January 1, 1905, to June 30, 1907—Continued.

Test No.	Field No. of coal.	Condition.	Weight of coal (pounds).	Production (pounds). Coke.	Production (pounds). Breeze.	Production (per cent). Coke.	Production (per cent). Breeze.	Production (per cent). Total.	Chemical analysis of coal. Moisture.	Chemical analysis of coal. Volatile matter.	Chemical analysis of coal. Fixed carbon.	Chemical analysis of coal. Ash.	Chemical analysis of coal. Sulphur.	Chemical analysis of coke. Moisture.	Chemical analysis of coke. Volatile matter.	Chemical analysis of coke. Fixed carbon.	Chemical analysis of coke. Ash.	Chemical analysis of coke. Sulphur.	Chemical analysis of coke. Phosphorus.
1	2	18	19	20	21	22	23	24	25	26	27	28	29	30	31	32	33	34	35
	Virginia—Cont'd.																		
63	2	1	12,000	7,518	291	62.65	2.43	65.08	3.88	34.11	57.01	5.00	1.02	0.25	1.08	91.25	7.42	0.68	0.0026
		2	11,534	7,499	290	65.02	2.51	67.53		35.49	59.31	5.20	1.06		1.08	91.48	7.44	.68	
69	2	1	12,000	7,314	433	60.95	3.61	64.56	3.86	34.13	56.39	5.62	.79	.69	.93	90.33	8.05	.65	
		2	11,537	7,264	430	62.97	3.73	66.70		35.50	58.65	5.85	.82		.94	90.96	8.10	.65	
70	2 (w.)	1	10,000	6,096	294	60.96	2.94	63.90	5.96	34.17	56.03	3.84	.91	.45	1.23	92.25	6.07	.69	
		2	9,404	6,069	293	64.54	3.12	67.66		36.34	59.58	4.08	.97		1.24	92.67	6.09	.69	
61	3	1	12,000	8,160	240	68.00	2.00	70.00	2.87	31.58	61.43	4.12	.56	.29	1.21	92.60	5.90	.61	.0011
		2	11,656	8,136	239	69.80	2.05	71.85		32.51	63.25	4.24	.58		1.21	92.87	5.92	.61	
88	3	1	12,000	7,907	336	65.89	2.80	68.69	2.49	31.90	61.16	4.45	.57	.16	1.26	91.85	6.73	.55	.0060
		2	11,701	7,894	335	67.46	2.86	70.32		32.72	62.72	4.56	.58		1.26	92.00	6.74	.55	
62	4	1	10,000	6,272	241	62.72	2.41	65.13	3.87	36.39	55.60	4.14	.39	.16	1.14	92.90	5.80	.42	.0046
		2	9,613	6,262	241	65.14	2.51	67.65		37.85	57.84	4.31	.41		1.14	93.05	5.81	.42	
181	6	1	10,910	6,698	267	61.39	2.45	63.84	5.05	22.95	62.11	9.89	1.49	.38	1.35	86.05	12.22	1.44	.0076
		2	10,359	6,673	266	64.42	2.57	66.99		24.17	65.41	10.42	1.57		1.35	86.38	12.27	1.45	
184	6 (w.)	1	11,180	6,150	191	55.01	1.71	56.72	5.48	24.77	64.96	4.79	1.45	.24	.32	93.73	5.71	1.24	.0083
		2	10,567	6,135	191	58.06	1.81	59.87		26.21	68.73	5.06	1.53		.32	93.96	5.72	1.24	
	Washington:																		
135	2	1	10,000	5,477	444	54.77	4.44	59.21	3.07	37.42	47.35	12.16	.44	1.02	2.10	77.53	19.35	.44	.0847
		2	9,693	5,421	439	55.93	4.53	60.46		38.60	48.85	12.55	.45		2.12	78.33	19.55	.44	
	West Virginia:																		
40	4 B	1	10,000	7,553	286	75.53	2.86	78.39	4.24	26.57	58.89	10.30	.97	.35	.68	86.01	12.96	.82	.0141
		2	9,576	7,527	285	78.60	2.98	81.58		27.75	61.50	10.75	1.01		.69	86.31	13.00	.82	
44	4 B (w.)	1	12,000	8,129	337	67.74	2.81	70.55	5.40	26.83	59.90	7.87	.93	.60	1.20	87.04	11.16	.72	.0186
		2	11,352	8,080	335	71.17	2.95	74.12		28.36	63.32	8.32	.98		1.20	87.57	11.23	.72	
46	4 B (w.)	1	9,760	7,220	268	73.98	2.75	76.73	3.87	27.72	59.67	8.74	.87	.27	1.37	86.98	11.38	.78	.0112
		2	9,382	7,201	267	76.75	2.85	79.60		28.84	62.07	9.09	.90		1.37	87.22	11.41	.78	
21	13	1	12,000	7,955	413	66.29	3.44	69.73	3.23	31.12	61.98	3.67	.86	.75	1.05	93.36	4.84	.77	.0045
		2	11,612	7,895	410	67.99	3.53	71.52		32.16	64.05	3.79	.89		1.06	94.07	4.87	.78	
23	13 and 14	1	12,000	8,093	215	67.44	1.79	69.23	4.81	29.28	62.84	3.07	.89	.43	1.37	94.20	4.00	.84	.0057
		2	11,423	8,057	214	70.53	1.87	72.40		30.76	66.02	3.22	.93		1.38	94.61	4.01	.84	
20	14	1	11,000	7,154	364	65.04	3.31	68.35	1.04	29.28	66.80	2.88	1.04	.38	.96	95.19	3.47	.94	.0046
		2	10,886	7,127	363	65.47	3.33	68.80		29.59	67.50	2.91	1.05		.97	95.55	3.48	.94	
36	15	1	10,000	6,867	276	68.67	2.76	71.43	1.79	37.90	53.00	7.31	2.73	.45	.78	88.70	10.07	2.09	
		2	9,821	6,835	275	69.60	2.80	72.40		38.59	53.97	7.44	2.78		.78	89.10	10.12	2.09	
43	15	1	12,000	8,404	269	70.03	2.24	72.27	2.33	38.33	51.72	7.62	2.72	.26	1.89	87.30	10.55	2.26	.0153
		2	11,720	8,382	268	71.52	2.29	73.81		39.24	52.95	7.81	2.78		1.89	87.53	10.58	2.27	
73	16 A	1	14,000	9,700	384	69.29	2.74	72.03	2.93	35.20	55.26	6.61	.92	.54	1.31	89.07	9.08	.81	.0226
		2	13,590	9,648	382	70.99	2.81	73.80		36.26	56.93	6.81	.95		1.32	89.55	9.13	.81	

45	16 B	1	12,000	8,124	276	67.70	2.30	70.00	5.70	32.52	53.44	8.34	1.20	.40	1.55	85.61	12.44	1.23	.0218
		2	11,316	8,092	275	71.51	2.43	73.94	......	34.49	56.67	8.84	1.27	......	1.56	85.95	12.49	1.24	......
48	16 B (w.)	1	12,000	7,984	289	66.53	2.41	68.94	5.31	32.83	55.89	5.97	.97	.37	1.18	89.87	8.58	.91	.0166
		2	11,363	7,954	288	70.00	2.53	72.53	......	34.67	59.02	5.31	1.02	......	1.19	90.20	8.61	.91	......
49	16 B (w.)	1	7,800	5,207	175	66.76	2.24	69.00	4.59	33.90	55.71	5.80	.95	.38	2.35	88.91	8.36	.89	.0133
		2	7,442	5,187	174	69.70	2.34	72.04	......	35.53	58.39	6.08	1.00	......	2.36	89.25	8.39	.89	......
60	17 (w.)	1	10,000	6,675	293	66.75	2.93	69.68	4.84	28.63	60.49	6.04	1.25	.07	.63	91.36	7.94	1.04	.0047
		2	9,516	6,670	293	70.09	3.08	73.17	......	30.09	63.57	6.34	1.31	......	.63	91.42	7.95	1.04	......
74	18	1	12,000	8,444	309	70.37	2.58	72.95	3.42	32.82	57.02	6.74	.70	.63	.97	89.54	8.86	.54	.0058
		2	11,590	8,391	307	72.40	2.65	75.05	......	33.98	59.04	6.98	.72	......	.97	90.11	8.92	.54	......
78	18	1	12,000	8,422	340	70.18	2.83	73.01	4.18	32.08	57.69	6.05	.61	.69	1.19	89.47	8.65	.53	.0037
		2	11,498	8,364	338	72.74	2.94	75.68	......	33.48	60.21	6.31	.64	......	1.20	90.09	8.71	.53	......
79	19	1	12,000	7,692	258	64.10	2.15	66.25	2.82	20.63	70.30	6.25	1.00	.38	1.68	89.96	7.98	.77	.0026
		2	11,662	7,663	257	65.71	2.20	67.91	......	21.23	72.34	6.43	1.03	......	1.69	90.30	8.01	.77	......
83	19	1	12,000	7,914	283	65.95	2.36	68.31	2.43	21.34	70.50	5.73	.96	.45	.55	91.57	7.43	.82	.0030
		2	11,708	7,878	282	67.29	2.41	69.70	......	21.87	72.26	5.87	.98	......	.56	91.98	7.46	.83	......
80	20	1	12,000	8,385	262	69.88	2.18	72.06	3.79	32.24	56.49	7.48	1.44	.17	1.08	89.01	9.74	1.10	.0040
		2	11,545	8,371	262	72.51	2.27	74.78	......	33.51	58.72	7.77	1.50	......	1.08	89.16	9.76	1.10	......
84	20 (w.)	1	12,000	8,037	208	66.98	1.73	68.71	5.34	32.56	57.00	5.10	1.09	.29	.46	91.73	7.52	.90	.0044
		2	11,359	8,014	207	70.55	1.82	72.37	......	34.39	60.22	5.39	1.15	......	.46	92.00	7.54	.90	......
87	20 (w.)	1	12,000	7,893	302	65.78	2.52	68.30	4.47	32.79	57.87	4.87	1.02	.17	.81	92.29	6.73	.85	.0036
		2	11,464	7,880	301	68.74	2.63	71.37	......	34.32	60.58	5.10	1.07	......	.81	92.45	6.74	.85	......
92	20	1	12,000	8,292	264	69.10	2.20	71.30	3.01	32.40	56.60	7.99	1.62	.18	.57	87.95	11.30	1.30	......
		2	11,639	8,277	264	71.11	2.27	73.38	......	33.41	58.36	8.23	1.67	......	.57	88.11	11.32	1.30	......
82	21	1	12,000	8,106	242	67.55	2.02	69.57	3.55	36.32	55.18	4.95	1.23	.24	.81	91.23	7.72	.98	.0027
		2	11,574	8,087	241	69.87	2.08	71.95	......	37.66	57.21	5.13	1.28	......	.81	91.45	7.74	.98	......
91	21 (w.)	1	12,000	7,816	249	65.13	2.08	67.21	5.72	36.54	54.35	3.39	1.01	.55	1.03	93.16	5.26	.76	......
		2	11,314	7,773	248	68.70	2.19	70.89	......	38.76	57.65	3.59	1.07	......	1.03	93.68	5.29	.76	......
175	25	1	11,340	6,920	381	61.02	3.36	64.38	4.56	34.38	53.39	7.67	.61	.30	.49	86.71	12.50	.47	.0082
		2	10,823	6,899	380	63.74	3.51	67.25	......	36.02	55.94	8.04	.64	......	.49	86.97	12.54	.47	......
	Wyoming:																		
52	3 (w.)	1	10,000	......	......	......	......	......	19.20	37.99	36.13	6.68	4.09	......	......	......	......	......	......
132	5	1	8,000	......	......	......	......	......	11.09	34.53	50.50	3.88	.84	......	......	......	......	......	......

DESCRIPTIONS OF COKE AND REMARKS.

The following notes are given to supplement the information contained in the preceding table:

"Cell structure" refers to the general appearance as to size and not to the number of cells as given by percentage of cells by volume. In many tests the cell structure as determined from general appearance is small when the percentage by volume indicates quite the reverse. (See, for example, test 29, Pennsylvania No. 8 coal, p. 24.)

Alabama No. 2 B.—Test 142: Soft, dense coke; dull appearance; cell structure very small; breakage, lumps of irregular size; 1-inch black butts.

Alabama No. 3.—Test 138: Dark-gray color, some deposited carbon; cell structure good; breakage good; long, large pieces; good, hard, heavy coke, with exception of ¾-inch black butts, which should be easily removed; ash high; washing would probably reduce ash and improve quality of coke.

Test 139: Light-gray color, some silvery deposit of carbon; good ring; cell structure good; breakage good; long, large pieces; good, strong, hard, heavy coke; improved very materially by washing.

Alabama No. 4.—Test 131: Light-gray and silvery color; metallic ring; cell structure good; breakage somewhat cross fractured, but pieces of good, large, uniform size; good, strong, heavy coke; ash high; probably could be reduced by washing.

Test 136: Light-gray and silvery color; metallic ring; cell structure rather large; breakage somewhat cross fractured, but pieces of good, uniform size; good, strong coke; ash very materially reduced by washing.

Alabama No. 5.—Test 171: Light-gray and silvery color; metallic ring; cell structure good; breakage good; uniform size; ash and sulphur high, both would probably be reduced by washing.

Alabama No. 6.—Test 172: Light-gray and silvery color; metallic ring; cell structure good; breakage somewhat cross fractured, but pieces of good, uniform size; good, heavy coke.

Test 174: Light-gray and silvery color; metallic ring; cell structure good; breakage somewhat cross fractured, but pieces of good, uniform size; good, heavy coke, somewhat better than coke from raw coal, but low ash and sulphur of this coal would not warrant washing.

Arkansas No. 1 B.—Test 95: Dull-gray color; soft, dense, punky coke; cell structure very small; breakage very bad and irregular; large and small chunks.

Test 96: Dull-gray color; soft, dense, punky coke, with no apparent cell structure; drawn from oven in large and small chunks, very easily crushed; test was run slowly and high enough heat was not obtained, which accounts for the large percentage of breeze.

Test 97: Dull-gray color; soft, dense coke; cell structure small; better than coke from washed coal.

Test 100: Dull-gray color; soft, dense, punky coke; possibly little better than coke from this coal, with addition of 10 per cent of pitch.

Arkansas No. 7 B.—Test 104: Dull, dark color; very soft, light-weight coke; no apparent cell structure; drawn from oven in large and small lumps; bottom 6 inches did not coke, burning to ash, all volatile being expelled, but did not stick together.

Test 105: Soft, dense, punky coke; drawn from oven in large and small chunks; somewhat better and heavier than coke from coal containing no pitch.

Arkansas No. 9.—Test 98: No coke produced; charge ashed over top and down about 5 inches.

Arkansas No. 9.—Test 99: No coke produced; ashed down about 4 inches.

Test 101: No coke produced; ashed down about 6 inches.

Test 102: Soft, dense, punky coke; drawn from oven in large and small chunks.

Test 103: Soft, dense, punky coke; drawn from oven in large and small chunks; high yield of breeze, due to large amount of coal whose volatile was expelled, not sticking together; 5 per cent of pitch not sufficient for this coal.

Georgia No. 1.—Test 173: Poor, dense coke; large pieces of irregular size; ash high; probably reduced ash and materially improved by washing.

Illinois No. 7 D.—Test 1: Good, hard coke with medium cell structure; breakage straight and long. This was the first charge after firing ovens, and results were not as good as might be expected.

Test 4: Light-gray and silvery color; metallic ring; cell structure good; breakage somewhat marred by cross fracture, but pieces of good size; good, strong coke, much improved by washing.

Illinois No. 11 D.—Test 5: Light-gray and silvery color; metallic ring; cell structure good,; breakage, good long pieces; good, strong coke.

Illinois No. 13.—Test 2: Dull-gray color; cell structure good; breakage marred by cross fracture, probably due to successive charging of small portions.

Test 3: Dull-gray color; cell structure small; cross breakage more pronounced than from washed coal.

Illinois No. 16.—Test 7: Accident to charging larry necessitated discontinuing test. Coal burned to keep oven hot.

Test 10: Dull-gray color; cell structure small.

Illinois No. 19 A.—Tests 11, 15, and 19: No coke produced; the whole charge was burned and volatile was expelled, but the residue would not bind together.

Illinois No. 20.—Test 106: Dull-gray color; cell structure small; breakage bad; separate and distinct cross fracture all over oven, coking in layers; ash and sulphur high.

Test 107: Dull-gray color; some little deposit of carbon; metallic ring; cell structure small, but not dense; breakage somewhat marred by cross fracture; pieces of good size; great improvement over former test; ash and sulphur high.

Illinois No. 21.—Test 126: No coke produced.

Test 137: Burned very vigorously for 12 hours, afterwards falling off rapidly to small candles all over surface of charge; when pulled, after 45 hours, product was mixture of unburned coal and slightly coherent mass of coal of original size showing no trace of cell structure; all volatile apparently expelled.

Illinois No. 22 B.—Test 117: Dull-gray color; cell structure medium; breakage very irregular, probably owing to high amount of slate; poor coke; heavy clinker over whole surface; ash and sulphur high.

Test 118: Light-gray color; upper 12 inches fingered, two 6-inch sections below in chunks; upper 12 inches had metallic ring and good cell structure; the remaining coke poor. This oven was held 72 hours on account of accident. Under more favorable conditions, the whole charge would have probably been better coke. Ash and sulphur high.

Illinois No. 23 A.—Test 111: Light-gray color; some silvery deposit of carbon; cell structure a little large; breakage large-fingered pieces; metallic ring; ash and sulphur high.

Illinois No. 23 B.—Test 112: Light-gray color; a little silvery deposit of carbon; metallic ring; cell structure a little large; breakage, long, thin pieces; larger charges would probably make better coke; ash and sulphur high.

Test 114: Light-gray color; a little silvery deposit of carbon; metallic ring; cell structure good; breakage, long, thin pieces and large 6-inch chunks; bottom very hot; bottom 6 inches probably coked upward; ash and sulphur high.

Illinois No. 24 A.—Test 119: No coke produced; ashed down about 4 inches.

Test 155: No coke produced; all volatile driven off; high heat of by-product ovens quickly applied might produce coke.

Illinois No. 24 B.—Test 145: Dull-gray color; practically no cell structure; barely stuck together; very poor, dense coke, with high sulphur.

Illinois No. 25 A.—Test 120: No coke produced.

Test 140: Dull-gray color; cell structure small; soft, dense coke; breakage poor; two distinct layers of 16 inches and 8 inches, the lower coming out in chunks; high ash and sulphur.

Illinois No. 26.—Test 143: Dull-gray color, soft, dense coke; breakage poor; practically no cell structure; ash and sulphur high.

Illinois No. 27.—Test 144: Poor, soft, dense coke; breakage poor; sulphur high.

Illinois No. 28 C.—Test 166: Dark-gray color; cell structure small; breakage, good, uniform size.

Illinois No. 29 A.—Test 169: Dark-gray color; drawn from oven in three distinct layers; breakage poor; large chunks and small-fingered pieces; poor, dense coke; high sulphur.

Test 170: Dull-gray color; some silvery coloration; metallic ring; drawn from oven in 6-inch chunks of practically uniform size; cell structure good; more rapid burning and higher heat produced gave much better coke than former charge; sulphur high.

Illinois No. 34 B.—Test 190: Light-gray and silvery color; metallic ring; cell structure a little large; breakage good; uniform-sized pieces; yield low on account of burning, but could be easily increased on better acquaintance; good coke; sulphur high.

Indiana No. 3.—Test 14: No coke produced; ashed down about 10 inches and blaze lost.

Indiana No. 4.—Test 6: Light-gray color; cell structure a little large; breakage somewhat marred by cross fracture.

Test 9: Light-gray and silvery color; metallic ring; fine-fingered pieces; cell structure large; ash and sulphur reduced by washing.

Indiana No. 5.—Test 8: Light-gray and silvery color; metallic ring; cell structure large; breakage, good, long pieces; good coke.

Indiana No. 6.—Test 12: Light-gray and silvery color; cell structure good; breakage good; metallic ring; good coke, but ash and sulphur high.

Indiana No. 7 A.—Test 13: Light-gray and silvery color; metallic ring; cell structure large; breakage somewhat marred by cross fracture, somewhat brittle; ash and sulphur high.

Indiana No. 9 A.—Test 16: Light-gray and silvery color; cell structure small; breakage somewhat marred by cross fracture, brittle; ash and sulphur high.

Indiana No. 9 B.—Test 17: Light-gray and silvery color; cell structures mall; long-fingered, heavy coke; high ash and sulphur.

Test 18: Light-gray and silvery color; metallic ring; breakage somewhat brittle; cell structure good; ash and sulphur somewhat reduced by washing, but still high.

Indiana No. 11 D.—Test 51: Light-gray color; metallic ring, breakage, long, fine-fingered pieces; cell structure medium.

Indiana No. 12.—Test 108: Light gray, with a little silvery coloration; metallic ring; cell structure a little large; breakage, good-sized pieces; ash and sulphur high.

Test 109: Light-gray color; some silvery deposit of carbon; cell structure large; breakage, good-sized pieces; ash and sulphur reduced by washing, but still high.

Test 110: Light-gray color; some silvery deposit of carbon; breakage practically the same as in test 109; somewhat larger size; cell structure not quite so large; metallic ring; good weight; ash and sulphur high.

Indiana No. 17.—Test 163: Dark-gray color; breakage, large pieces of irregular size; cell structure large; ash and sulphur high.

Indiana No. 18 A.—Test 158: No coke produced; ashed down about 3 inches, and blaze lost.

Test 168: No coke produced.

Kansas No. 6.—Test 113: Light-gray color, some silvery coloration; cell structure good; breakage good; long, large, heavy pieces; heavy clinker over whole surface of coke; ash and sulphur high; washing would probably reduce ash very materially, and produce better grade of coke.

Test 115: Light-gray and silvery color; metallic ring; breakage good; long, large, heavy pieces; cell structure good; strong heavy coke; washing reduces ash and sulphur, but both still high.

Kentucky No. 1 B.—Test 76: Light-gray and silvery color; much deposited carbon; metallic ring; cell structure good; a fine-fingered coke; breakage bad, brittle.

Kentucky No. 1 C.—Test 71: Light-gray and silvery color; metallic ring; cell structure a little large; breakage, long, thin-fingered pieces; good coke, but very brittle.

Kentucky No. 5.—Test 75: Light-gray and silvery color; much deposited carbon; metallic ring; cell structure good; breakage bad, very brittle.

Kentucky No. 6.—Test 86: Light-gray and silvery color; metallic ring; cell structure small; breakage, long, fine-fingered pieces, very brittle.

Test 90: Light-gray and silvery color; metallic ring; cell structure small; breakage bad, brittle; fine-fingered coke.

Kentucky No. 7.—Test 85: Light-gray and silvery color; metallic ring; cell structure good; breakage good; long, large pieces; coke contains a large amount of hard clinker on top and through cracks; good weight coke; ash and sulphur high.

Kentucky No. 8.—Test 164: Dark-gray color, with some little silvery deposit of carbon; cell structure large; breakage good; regular-sized pieces.

Test 165: Light-gray color; breakage good; large pieces of regular size; cell structure a little large; some little improvement over test No. 164.

Kentucky No. 9 A.—Test 167: Light-gray color, with black top and some silvery deposit of carbon; cell structure good; breakage, long-fingered pieces; sulphur high.

Maryland No. 1.—Tests 50, 54: No coke produced.

Test 58 (with 10 per cent pitch): Dull-gray color; cell structure small; breakage, large and small chunks; poor, soft coke.

Missouri No. 5.—Test 116: Light-gray and silvery color; cell structure good; breakage somewhat cross fractured but pieces of good, large size; good weight coke; ash and sulphur high.

New Mexico No. 3 B.—Test 148: Light-gray color, some silvery deposit of carbon; metallic ring; cell structure medium; breakage good; long, large pieces; good, heavy coke, but ash high.

Test 149: Light-gray color; some silvery deposit of carbon; metallic ring; cell structure medium; breakage good; long, large pieces; good, heavy coke; ash reduced by washing, but still high.

New Mexico Nos. 3 B, 4 B, and 5.—Test 152: Light-gray and silvery color; metallic ring; cell structure good; breakage good; long, large pieces; good, strong, heavy coke.

New Mexico No. 4 B.—Test 150: Light-gray color; silvery deposit of carbon; metallic ring; cell structure good; breakage somewhat cross fractured, but pieces of good, large, uniform size; good, heavy coke; high ash.

Test 151: Light-gray and silvery color; large deposit of carbon; metallic ring; cell structure good; breakage good; long, large pieces; good, strong, heavy coke; ash reduced by washing.

New Mexico No. 5.—Test 146: Light-gray color; cell structure a little large; breakage somewhat marred by cross fracture; good, heavy coke; ash high; blaze lost after 15 hours, and necessary heat not attained.

New Mexico No. 5.—Test 147: Light-gray color, some silvery deposit of carbon; metallic ring; cell structure a little large; breakage good; long, large, heavy pieces; ash reduced by washing, but still high.

Ohio No. 1.—Test 24: Light-gray and silvery color; metallic ring; breakage good; fine-fingered pieces; cell structure good; good weight coke; high sulphur.

Ohio No. 2.—Test 27: Dull-gray color; cell structure close; poor coke, soft and easily broken.

Ohio No. 3.—Test 31: Charge burned to ash.

Ohio No. 4.—Test 28: Light-gray and silvery color; metallic ring; breakage good; long, large pieces; cell structure good; very heavy; sulphur high.

Ohio No. 5.—Test 22: Light-gray and silvery color; metallic ring; cell structure good; long-fingered coke, brittle.

Ohio No. 6.—Test 59: Light-gray and silvery color; metallic ring; cell structure a little large; breakage good; large, long, heavy pieces; high sulphur.

Test 66: Light-gray and silvery color; metallic ring; cell structure large; breakage somewhat crosswise, but good-sized pieces; ash and sulphur reduced by washing, but sulphur still high.

Ohio No. 7.—Test 89: Light-gray and silvery color; metallic ring; cell structure a little large; breakage good; long pieces; large-fingered coke; high sulphur.

Test 94: Light-gray and silvery color; metallic ring; cell structure a little large; breakage fine-fingered; very brittle; ash and sulphur reduced by washing, but sulphur still high.

Ohio No. 8.—Test 81: Light-gray color; metallic ring; breakage long, thin pieces; cell structure small; fingered coke, very brittle; ash and sulphur high.

Test 93: Light-gray color, with black-fused bottom, not a butt; metallic ring; cell structure small. About three-fourths of oven coked up 8 inches, and the upper 16 inches coked down, showing clear demarcation; the lower 8 inches in chunks, the upper 16 inches fingered; very brittle; ash and sulphur reduced by washing, but sulphur high.

Ohio No. 9 A.—Test 72: Light-gray and silvery color; metallic ring; breakage long and thin pieces; fine-fingered coke, very brittle; sulphur high.

Ohio No. 9 B.—Test 55: Dull-gray color; cell structure small; breakage bad; very brittle; ash and sulphur high.

Test 57: Light-gray color; metallic ring; cell structure good; breakage bad; fine-fingered coke, very brittle; sulphur high; ash greatly reduced by washing.

Ohio No. 12.—Test 180: Light-gray color; some silvery deposit of carbon; metallic ring; cell structure large; breakage somewhat cross fractured; sulphur high.

Pennsylvania No. 5.—Test 25: Light-gray and silvery color; much deposited carbon; metallic ring; cell structure a little large; breakage good; long, large pieces; good, heavy coke.

Test 26: Light-gray and silvery color; metallic ring; cell structure good; breakage good; long, large pieces; good, heavy coke; ash and phosphorus reduced by washing, the phosphorus over 50 per cent.

Pennsylvania No. 6.—Test 32: Light-gray and silvery color; much deposited carbon; metallic ring; cell structure good; breakage good; long, large pieces; very heavy coke; sulphur and ash high.

Test 34: Light-gray and silvery color; metallic ring; cell structure good; breakage somewhat irregular, but not so good as from raw charge; very heavy coke; ash and sulphur reduced by washing.

Test 35: Light-gray and silvery color; metallic ring; cell structure good; breakage good; long, large pieces; very heavy; ash and sulphur high.

Test 38: Light-gray and silvery color; metallic ring; cell structure a little small; breakage good; ash and sulphur reduced by washing.

Pennsylvania No. 6.—Test 41: Light-gray and silvery color; much deposited carbon; metallic ring; cell structure small; breakage good; long, large pieces; very heavy; ash and sulphur high.

Pennsylvania No. 7.—Test 30: Light-gray color; cell structure small; breakage long and irregular, but in large pieces; very heavy; ash and sulphur high.

Test 33: Light-gray color; breakage, large and small lumps, very irregular; cell structure small; coke heavy; sulphur reduced by washing; ash not materially affected.

Pennsylvania No. 8.—Test 29: Dull-gray color; breakage bad; large and small chunks; cell structure small; soft, dense coke.

Pennsylvania No. 9.—Test 37: Some few pieces of coke obtained, but the amount was so small that it was not determined.

Test 39: Some few pieces of coke; mostly large lumps of closely adhering ash.

Test 42: Dull-gray color; cell structure small; poor, dense coke.

Test 56 (with 5 per cent pitch): Dull-gray color; cell structure medium; breakage very irregular; large and small lumps; poor, soft coke, scarcely any better than coke from washed coal.

Pennsylvania No. 10.—Test 47: Light-gray and silvery color; metallic ring; breakage poor, somewhat brittle; cell structure large.

Test 53: Light-gray and silvery color; metallic ring; cell structure good; breakage bad; increase in yield of coke and decrease in amount of breeze probably due to fine grinding.

Pennsylvania No. 11.—Test 159: Light-gray color; metallic ring; cell structure a little small; breakage good; long, large pieces.

Pennsylvania No. 12.—Test 161: Light-gray and silvery color; metallic ring; cell structure a little small; breakage good; large pieces; good, heavy coke; sulphur a little high.

Test 162: Light-gray color; some deposit of carbon; metallic ring; cell structure a little small; breakage good; uniform-sized pieces; ash reduced by washing; good, strong coke.

Pennsylvania No. 15.—Test 185: Dull-gray color; soft, dense coke; cell structure small; breakage badly cross fractured, and pieces of irregular size; sulphur high.

Test 188: Light-gray color, some silvery deposit of carbon; cell structure medium; breakage somewhat cross fractured, but pieces of good, uniform size; much improvement over coke from finely ground charge; sulphur high.

Pennsylvania No. 17.—Test 178: Light-gray and silvery color; cell structure a little small; breakage good; long, large pieces; good, heavy coke.

Test 186: Light-gray and silvery color; metallic ring; cell structure good; breakage good; large pieces of uniform size; good, strong, heavy coke; ash and sulphur reduced by washing.

Pennsylvania No. 19.—Test 176: Light-gray color; some silvery deposit of carbon; cell structure small; breakage marred by cross fracture, probably due in large measure to uncrushed slate; good, heavy coke, somewhat brittle.

Test 177: Light-gray and silvery color; metallic ring; cell structure a little small; breakage good; large, uniform pieces; crushing improves physical appearances and increases total yield.

Pennsylvania No. 20.—Test 179: Gray color, some silvery deposit; cell structure small; breakage irregular, but pieces of good size; soft, dense coke; high sulphur.

Test 182: Gray color; soft, dense coke; no evident physical improvement over raw charge; ash and sulphur reduced by washing.

Pennsylvania No. 21.—Test 183: Light-gray and silvery color; metallic ring; cell structure small but not dense; breakage somewhat marred by cross fracture, but pieces of good, uniform size; good, heavy coke.

Pennsylvania No. 21.—Test 187: Light-gray and silvery color; metallic ring; cell structure small, not dense; breakage good; long, large pieces; good, heavy coke.

Test 189: Light-gray and silvery color; metallic ring; cell structure small, not dense; breakage somewhat marred by cross fracture, but pieces of good, uniform size; good, heavy coke.

Test 191: Light-gray and silvery color; cell structure small, not dense; metallic ring; breakage good; uniform size; good, heavy coke.

Test 192: Light-gray and silvery color; metallic ring; cell structure a little small, not dense; breakage good; uniform size; good, heavy coke.

Tennessee No. 1.—Test 133: Light-gray and silvery color; metallic ring; cell structure a little large; breakage good; long, large pieces; good, strong, hard, heavy coke; ash a little high.

Test 153: Light-gray and silvery color; metallic ring; cell structure good; breakage somewhat marred by cross fracture, but pieces of good, uniform size; good, heavy coke; ash and sulphur reduced by washing.

Tennessee No. 2.—Test 127: Light-gray and silvery color; metallic ring; cell structure medium; breakage poor; very brittle, long-fingered pieces.

Tennessee No. 3.—Test 128: Light-gray and silvery color; metallic ring; cell structure good; breakage poor; very brittle, long-fingered pieces.

Tennessee No. 4.—Test 125: Light-gray and silvery color; metallic ring; cell structure good; breakage, long-fingered pieces; $\frac{3}{4}$-inch black butt.

Test 129: Light-gray and silvery color; metallic ring; cell structure good; breakage, long-fingered pieces; black butt removed.

Tennessee No. 5.—Test 154: Light-gray and silvery color; metallic ring; cell structure a little large; breakage good; long, large pieces; good, heavy coke; sulphur high.

Tennessee No. 6.—Test 122: Light-gray and silvery color; metallic ring; cell structure good; breakage, good; long, large pieces; good, strong, heavy coke; ash high; probably reduced by washing.

Tennessee No. 7 B.—Test 121: Poor coke; soft, tough, and punky; drawn from oven in large chunks; ash and sulphur high.

Test 123: Light-gray and silvery color; metallic ring; cell structure a little large; breakage good; large, uniform-sized pieces; strong coke, great improvement over raw charge; ash and sulphur reduced by washing, but still high.

Tennessee No. 8 B.—Test 134: Light-gray and silvery color; metallic ring; cell structure large; breakage somewhat cross fractured, but pieces of good, large, uniform size; sulphur high.

Tennessee No. 9.—Test 124: Light-gray color; some silvery deposit of carbon; metallic ring; cell structure large; breaks in irregular pieces of good size.

Tennessee No. 10.—Test 156: Poor coke; drawn from oven in large, irregular lumps; very tough and dense; with black butt and high ash.

Tennessee No. 11.—Test 160: Poor coke; breakage, large pieces of irregular size; cell structure small; dense and punky; small amount not coked well at bottom; ash high.

Utah No. 1.—Test 130: Dull-gray color; practically no cell structure; soft, dense coke; very fine-fingered pieces, very brittle, and easily broken into small pieces.

Test 141: With R. I. No. 1. No coke produced; all volatile expelled and charge burned entirely to bottom.

Test 157: With R. I. No. 1. Very poor, dense coke; half the product did not cement together; the other half very finely fingered coke, very brittle and easily broken, similar to coke from Utah No. 1.

Virginia No. 1.—Test 64: Light-gray color; metallic ring; cell structure good; breakage somewhat marred by cross fracture, but pieces of good size; hard, heavy coke, not dense.

Test 65: Light-gray and silvery color; much deposited carbon; cell structure medium; metallic ring; breakage somewhat marred by cross fracture, but pieces of good size; good, hard coke.

Test 67: Light-gray and silvery color; much deposited carbon; cell structure medium; metallic ring; breakage somewhat marred by cross fracture, probably due to uncrushed slate; lower yield of coke and higher amount of breeze probably due to fact that coal was not crushed.

Test 68: Light-gray and silvery color; much deposited carbon; metallic ring; cell structure medium; breakage somewhat marred by cross fracture, but pieces of good size; large amount of breeze and lowered percentage yield probably due to fact that coal was not crushed.

Test 77: Light-gray and silvery color; much deposited carbon; metallic ring; cell structure good; breakage somewhat marred by cross fracture, but pieces of good size; good, hard, heavy coke; increased yield of coke and decreased amount of breeze probably due to fine grinding.

Virginia No. 2.—Test 63: Light-gray and silvery color; metallic ring; cell structure a little large; breakage somewhat marred by cross fracture, but pieces of good size.

Test 69: Light-gray and silvery color; much deposited carbon; metallic ring; cell structure medium; breakage good; long, large pieces, somewhat brittle; decreased yield of coke and increased amount of breeze probably due to fact that coal was not crushed.

Test 70: Light-gray and silvery color; metallic ring; cell structure large; breakage somewhat marred by cross fracture, but pieces of good size; good, hard coke, somewhat brittle; washing does not seem to benefit it materially.

Virginia No. 3.—Test 61: Light-gray and silvery color; much deposited carbon; metallic ring; cell structure small; breakage good; long, large, heavy pieces; very heavy coke.

Test 88: Light-gray and silvery color; much deposited carbon; metallic ring; cell structure small; breakage good; good, heavy coke; decreased yield of coke and increased amount of breeze probably due to fact that coal was not crushed.

Virginia No. 4.—Test 62: Light-gray and silvery color; much deposited carbon; metallic ring; cell structure good; breakage, long, thin pieces; light weight; fingered coke.

Virginia No. 6.—Test 181: Light-gray color; cell structure small; dense coke; breakage very irregular; pieces of various sizes; high sulphur.

Test 184: Light-gray and silvery color; much deposited carbon; cell structure small, but not dense; breakage, irregular pieces of various sizes; washing reduces ash and sulphur and improves quality of coke.

Washington No. 2.—Test 135: Light-gray color; some deposit of carbon; fair ring; cell structure small; breakage, long-fingered pieces, very brittle; dense coke; high ash.

West Virginia No. 4 B.—Test 40: Light-gray and silvery color; much deposited carbon; metallic ring; cell structure good.

Test 44: Light-gray and silvery color; much deposited carbon; metallic ring; cell structure good; breakage good; long, large pieces.

Test 46: Light-gray and silvery color; metallic ring; cell structure good; breakage somewhat marred by cross fracture, but pieces of good size; high yield of coke and decreased amount of breeze probably due to fine grinding.

West Virginia No. 13.—Test 21: Light-gray and silvery color; metallic ring; cell structure good; breakage good; long, large, heavy pieces.

West Virginia Nos. 13 and 14.—Test 23: Light-gray and silvery color; metallic ring; cell structure medium; breakage good; long, large, heavy pieces.

West Virginia No. 14.—Test 20: Light-gray and silvery color; metallic ring; cell structure a little large; breakage good; long, large, heavy pieces; good, hard coke.

West Virginia No. 15.—Test 36: Light-gray and silvery color; much deposited carbon; metallic ring; cell structure good; breakage good; long, large, pieces; good, heavy coke; high sulphur.

Test 43: Light-gray and silvery color; metallic ring; cell structure a little small; breakage good; long, large pieces; hard, heavy coke; sulphur high.

West Virginia No. 16 A.—Test 73: Light-gray and silvery color; much deposited carbon; metallic ring; cell structure a little large; breakage somewhat marred by cross fracture, but pieces of good size; good, hard, heavy coke.

West Virginia No. 16 B.—Test 45: Cell structure good; breakage good; long, large pieces; good, heavy coke.

Test 48: Light-gray and silvery color; much deposited carbon; metallic ring; cell structure a little large; breakage somewhat marred by cross fracture, but pieces of good size; somewhat brittle; washing does not appear to improve coke, on the contrary the coke from the raw charge is decidedly better.

Test 49: Light-gray and silvery color; metallic ring; cell structure large; breakage somewhat marred by cross fracture; coke brittle; washing does not appear to improve physical properties of coke; sulphur and ash somewhat lowered.

West Virginia No. 17.—Test 60: Light-gray and silvery color; metallic ring; cell structure good; breakage good.

West Virginia No. 18.—Test 74: Light-gray and silvery color; much deposited carbon; metallic ring; cell structure good; breakage somewhat crosswise; coke brittle; good, hard, heavy coke.

Test 78: Light-gray and silvery color; metallic ring; cell structure good; breakage somewhat crosswise; coke brittle; good, hard, heavy coke; no appreciable difference in yield between the crushed and uncrushed charges.

West Virginia No. 19.—Test 79: Dull-gray color; some silver; cell structure small, rather dense; breakage good; poor, light-weight coke.

Test 83: Dull-gray color; some silver; cell structure small; breakage good. This oven was burned with a smaller draft and coke was much heavier and better than that from test 79.

West Virginia No. 20.—Test 80: Light-gray and silvery color; much deposited carbon; metallic ring; cell structure small; not dense; breakage good; long, large, pieces, somewhat brittle; good, hard, heavy coke.

Test 84: Light-gray and silvery color; metallic ring; cell structure good; breakage marred by cross fracture, but pieces of good size; washing does not materially benefit; on the contrary, the coke is not as good as that from raw coal.

Test 87: Light-gray and silvery color; much deposited carbon; metallic ring; cell structure a little small; breakage very irregular, but pieces of good size; decreased percentage of coke and increased percentage of breeze probably due to fact that coke was not crushed.

Test 92: Light-gray and silvery color; metallic ring; cell structure small, not dense; breakage somewhat marred by cross fracture, but pieces of good size; good, heavy coke.

West Virginia No. 21.—Test 82: Light-gray and silvery color; much deposited carbon; metallic ring; cell structure good; breakage good; long, large pieces; good, hard, heavy coke.

Test 91: Light-gray and silvery color; much deposited carbon; metallic ring; cell structure large; breakage very irregular and brittle; washing does not materially improve coke, on the contrary the coke from raw charge is decidedly better.

West Virginia No. 25.—Test 175: Light-gray color, some silvery deposit of carbon; cell structure a little small; breakage, long, large, fingered pieces, very brittle.
Wyoming No. 3.—Test 52: Charge burned to ash down about 8 inches.
Wyoming No. 5.—Test 132: No coke produced.

CONCLUSIONS.

It is unfortunate that the necessary routine work in order to cover so many coals permitted so few tests on each, and that the supply of coal in many cases permitted only one test to be made on that particular coal. The data here presented show the results obtained under the best conditions possible to one not conversant with the burning of these coals, based on observations made from time to time as coking proceeded. These facts should be distinctly borne in mind when analyzing the results here presented. It is hoped that in future work it may be possible to vary conditions, make changes as they suggest themselves, and compare results on many different tests of the same coal and thus draw conclusions of a more definite nature. It is to be regretted that no comparisons can be made between beehive and by-product coke, but the nature of the work here recorded and the facilities provided confined operations to ovens of the beehive pattern exclusively.

No data are given in the detailed statement for compressive strength or height of furnace burden supported, as the results obtained show conclusively the worthlessness of these determinations. This conclusion was reached after careful attempts to obtain results on 1-inch cubes. Four cubes were selected from each coke made, care being taken to obtain pieces with no fracture and representing as nearly as possible the average of the coke. The cubes were cut by means of an emery wheel and guide, and although by no means perfect they were as nearly so as possible and always the two sides used in the machine were parallel. The machine used for breaking was a Tinius Olsen patent machine of 10,000 pounds capacity and gave direct readings of the ultimate strength.

Only a few of these results, taken at random, are given, and these only to show their great variation and the worthlessness of this method of drawing conclusions. Illinois No. 16, test 10, 910 pounds, 1,330 pounds, 2,190 pounds, and 2,270 pounds; Indiana No. 4, test 6, 640 pounds, 790 pounds, 1,060 pounds, and 1,245 pounds; Kentucky No. 1, test 76, 880 pounds, 1,065 pounds, 1,920 pounds, and 2,570 pounds; Ohio No. 9, test 94, 535 pounds, 890 pounds, 1,170 pounds, and 1,600 pounds; Virginia No. 1, test 68, 740 pounds, 1,120 pounds, 1,280 pounds, and 2,060 pounds; West Virginia No. 16, test 49, 520 pounds, 1,500 pounds, 1,780 pounds, and 2,100 pounds.

The difficulty of obtaining a cube, or any number of cubes, to represent anything more than the piece of coke from which it is taken is so apparent that results pretending to show compressive strength of any

amount of coke are worse than useless—in fact, misleading. Even if coke is selected the whole height of the charge and tests are made on cubes in number representing the number of inches the results still show only the strength of the one piece of coke from some particular part of the oven and it is practically impossible to procure even approximately similar results from other pieces taken from different places. The condition of burning, the quenching either inside or out, and any number of factors which it is not possible to know, much less control, make different portions of the same oven vary greatly.

A simple calculation will show that coke with a compressive strength of 48 pounds will support the burden of any modern furnace; consequently this test gives no data of practical value. Moreover, there are so many other factors, such as action of heat and gases, attrition of coke against coke, against other ingredients of charge, and against the side walls, etc., that any calculation to show the burden-bearing capacity of the coke, even if it were possible to select cubes representing the whole charge, would be inaccurate if based simply on a compression test.

An endeavor was made to compare the different cokes by approximating the amount of breakage under conditions of present-day handling, showing the percentage of coke over 2-inch size that may be expected to reach the top of the charge in the blast furnace. Fifty pounds of each coke were selected, as nearly as possible representing the average size of the coke after handling at the ovens. This coke was dropped a distance of 6 feet onto a rigid (1-inch) iron plate. All pieces over 2 inches in size were weighed and again dropped, the operation being repeated three times. The results of these drop tests are shown in the detailed statement.

The yield of coke appears to be increased and the amount of breeze reduced by preliminary crushing. Whether there is a limit to the degree of fineness, or whether a point may be reached beyond which finer crushing gives no appreciable improvement or has opposite effects, can not be determined from the present results; but the data available indicate that it would be economical to crush all coal before charging into the ovens, even though a coke of good quality may be obtained without this preliminary treatment. Fine crushing also appears to increase the strength of the coke and make the fracture less irregular, by the greater uniformity and distribution of the ash, but the weight per cubic foot is reduced. The strength of the coke is probably influenced by the amount, composition, and distribution of the ash, but the results so far obtained show no definite relations between these factors or their relative importance.

The matter of investigating the action of CO_2 on red-hot coke as determining its value for furnace work was thoroughly considered.

The conclusion was reached that it was of no practical importance, as there are so many other factors in the blast furnace. In view of the fact that the gases in the furnace are mixtures of CO_2, CO, H, O, N, water vapor, and probably others, it appears that action of CO_2 is of little value unless the action of these other gases, either independently or in connection with CO_2, is known. An investigation of the action of CO_2 on red-hot coke, as a means of making comparison of hardness, is being made and gives evidence of yielding some positive results, but work along this line has not progressed far enough to draw any definite conclusions.

The loss of sulphur from coal to coke by volatilization varies with the different coals, depending on several factors, among which, in the order of their importance, are the condition in which sulphur exists in the coal, the heat of the oven, the rapidity of coking, and watering. The sulphur loss ranged from 20.79 per cent on Arkansas No. 1 (test 95) to 63.07 per cent on Illinois No. 29 (test 170), the average for all tests being 43.27 per cent.

CUPOLA TESTS OF COKE.

By Richard Moldenke.

EQUIPMENT.

Owing to the removal of one of the cupolas which served for the foundry tests during the Louisiana Purchase Exposition all the tests made since then have been conducted in the 36-inch foundry cupola loaned by the Whiting Foundry Equipment Company, of Chicago. The remaining apparatus was rearranged and the 36-inch shell of the cupola was relined to 26 inches internal diameter. There were four horizontal tuyeres measuring 4 by 6 inches on the outside and 3 by 13 inches on the inside of the cupola which were situated 11 inches above the sand bottom. The total tuyere area was 96 square inches, giving a ratio of 1 to 5.96 with the cupola area. A No. 6 Sturtevant fan run at 2,514 revolutions per minute furnished the blast, which was kept at about 7 ounces.

By proper training, the crew was able to run off two heats a day without interruption. The melted iron was poured into molds for sash weights, thus reducing to a minimum the amount of scrap made.

PERSONNEL.

The cupola tests were conducted by W. G. Ireland, under the direction of A. W. Belden, coke expert of the Geological Survey, and by the advice of Richard Moldenke, foundry expert in charge of the cupola tests of the fuel-testing plant.

METHOD OF TESTING.

The method of testing has been fully described in the report of the fuel-testing plant for 1904.[a] Toward the end of the tests it was sometimes necessary to vary the proportion of scrap to pig iron according to the supply, but the total amounts were kept correct as planned for the general series of tests.

After completing the tests on the available cokes in the regular way, so that the results might be comparable with the previous work

[a] Prof. Paper U. S. Geol. Survey No. 48, part 3, 1906, pp. 1367–1370.

of the division, a series of further tests was made on some of these cokes. In these tests the coke bed was not kept at a constant height above the tuyeres, but the carbon content was calculated from the analysis of the particular coke and an amount taken to make up 175 pounds of carbon regardless of the height above the tuyeres. The results show interesting features. Some cokes gave melting ratios and melting rates per hour which were better than with the ordinary test methods and others gave inferior results. The tests were made to show the advisability on the part of the manufacturer as well as of the foundryman of studying the conditions of cupola practice in order to determine those which give the best results.

DETAILED RESULTS.

The detailed results of the regular tests as well as of the special 175-pound carbon bed tests will be found in the following tables. Results of a typical test of Connellsville 72-hour coke are given at the head of the first table as a standard for comparison. All the tests here reported were made within the calendar year 1906 except test 190, on coke from Pennsylvania No. 21 coal, the date of which was February 13, 1907. Many of the coals tested, however, were received during 1905.

Cupola tests of coke from coals received in 1905.

Cupola test No.	Designation of coke. Field No. of coal.[a]	Designation of coke. Coke test No.	Date.	Charges (pounds). Coke bed.	Pig iron.	Scrap.	Coke.	Pig iron.	Scrap.	Coke.	Pig iron.	Scrap.	Coke.	Pig iron.	Scrap.	Coke.	Pig iron.	Scrap.	Total. Coke.	Total. Pig iron.	Total. Scrap.	Ratio iron to coke.
1	2	3	4	5	6	7	8	9	10	11	12	13	14	15	16	17	18	19	20	21	22	23
			1904.																			
19	Connellsville coke	......	Nov. 30	220	660	220	53	398	133	53	398	133	52	397	132	52	397	132	430	2,250	750	7
	Illinois:		1906.																			
54	11 D (w.)	5	Sept. 17	190	570	190	60	420	140	60	420	140	60	420	140	60	420	140	430	2,250	750	7
21	13 (w.)	2	July 10	200	600	200	58	413	137	58	413	137	57	412	138	57	412	138	430	2,250	750	7
93	13	3	Oct. 6	220	660	220	53	398	133	53	398	133	52	397	132	52	397	132	430	2,250	750	7
94	16	10	Nov. 8	220	660	220	53	398	133	53	398	133	52	397	132	52	397	132	430	2,250	750	7
	Indiana:																					
82	4 (w.)	9	Sept. 27	180	540	180	63	428	143	63	428	143	62	427	142	62	427	142	430	2,250	750	7
83	5	8	Sept. 28	170	510	170	65	435	145	65	435	145	65	435	145	65	435	145	430	2,250	750	7
187	5	8	Dec. 7	180	720	....	80	570	....	80	570	....	80	570	....	80	570	....	500	3,000	(b)	6
48	7 A (w.)	13	Sept. 12	170	510	170	65	435	145	65	435	145	65	435	145	65	435	145	430	2,250	750	7
175	7 A (w.)	13	Nov. 30	215	645	215	54	402	134	54	401	134	54	401	134	53	401	133	430	2,250	750	7
173	9	17	Nov. 28	200	800	....	44	550	....	44	550	....	44	550	....	43	550	....	375	3,000	(b)	8
174	9	17	....do...	210	840	....	73	540	....	73	540	....	72	540	....	72	540	....	500	3,000	(b)	6
81	9 B (w.)	18	Sept. 26	180	540	180	63	428	143	63	428	143	62	427	142	62	427	142	430	2,250	750	7
185	9 B (w.)	18	Dec. 6	205	615	205	57	409	137	56	409	136	56	409	136	56	408	136	430	2,250	750	7
22	11	51	July 11	190	570	190	60	420	140	60	420	140	60	420	140	60	420	140	430	2,250	750	7
184	11	51	Dec. 5	205	615	205	57	409	137	56	409	136	56	409	136	56	408	136	430	2,250	750	7
	Kentucky:																					
29	1 C	71	July 17	190	570	190	60	420	140	60	420	140	60	420	140	60	420	140	430	2,250	750	7
26	1 B	76	July 14	190	570	190	60	420	140	60	420	140	60	420	140	60	420	140	430	2,250	750	7
27	5	75	July 16	200	600	200	58	413	138	58	413	138	57	412	137	57	412	137	430	2,250	750	7
28	6	90	....do...	200	600	200	58	413	138	58	413	138	57	412	137	57	412	137	430	2,250	750	7
89	6	90	Aug. 30	205	615	205	57	409	136	56	409	136	56	409	136	56	408	137	430	2,250	750	7
67	6	86	Aug. 16	210	630	210	55	405	135	55	405	135	55	405	135	55	405	135	430	2,250	750	7
47	7	85	Sept. 11	180	720	....	63	570	....	63	570	....	62	570	....	62	570	....	430	3,000	....	7
55	7	85	Aug. 7	190	570	190	60	420	140	60	420	140	60	420	140	60	420	140	430	2,250	750	7
	Maryland:																					
75	1 (w.) [c]	58	Sept. 22	200	600	200	58	413	138	58	413	138	57	412	137	57	412	137	430	2,250	750	7
	Ohio:																					
23	5	22	July 12	200	600	200	58	413	138	58	413	138	57	412	137	57	412	137	430	2,250	750	7
80	6 A, 6 B (w.)	66	Sept. 26	170	510	170	65	435	145	65	435	145	65	435	145	65	435	145	430	2,250	750	7
57	7 (w.)	94	Aug. 8	190	570	190	60	420	140	60	420	140	60	420	140	60	420	140	430	2,250	750	7
70	7	89	Aug. 18	190	570	190	60	420	140	60	420	140	60	420	140	60	420	140	430	2,250	750	7
56	8 A (w.)	93	Aug. 8	200	600	200	58	413	138	58	413	138	57	412	137	57	412	137	430	2,250	750	7
165	9	72	Nov. 22	190	760	....	47	560	....	46	560	....	46	560	....	46	560	....	375	3,000	(d)	8

166	9	72	Nov. 23	180	720	......	80	570	......	80	570	......	80	570	......	80	570	......	500	3,000	(d)	6
	Pennsylvania:																					
68	5 B (w.)	26	Sept. 20	180	540	180	63	428	143	63	428	143	62	427	142	62	427	142	430	2,250	750	7
180	5 B (w.)	26	Dec. 3	190	570	190	60	420	140	60	420	140	60	420	140	60	420	140	430	2,250	750	7
60	6	32	Sept. 18	240	720	240	48	383	128	48	383	128	47	382	127	47	382	127	430	2,250	750	7
85	6	41	Sept. 29	220	660	220	53	398	133	53	398	133	52	397	132	52	397	132	430	2,250	750	7
87	6	41	Oct. 1	230	690	230	50	390	130	50	390	130	50	390	130	50	390	130	430	2,250	750	7
84	6 A, 6 B (w.)	34	Sept. 29	220	660	220	53	398	133	53	398	133	52	397	132	52	397	132	430	2,250	750	7
176	6 A, 6 B (w.)	34	Nov. 30	200	600	200	58	413	138	58	413	138	57	412	137	57	412	137	430	2,250	750	7
25	6 A, 6 B (w.)	38	July 14	200	600	200	58	413	138	58	413	138	57	412	137	57	412	137	430	2,250	750	7
61	6 A, 6 B (w.)	38	Sept. 18	220	660	220	53	398	133	53	398	133	52	397	132	52	397	132	430	2,250	750	7
66	7 A, 7 B (w.)	33	Sept. 20	220	660	220	53	398	133	53	398	133	52	397	132	52	397	132	430	2,250	750	7
79	7 A, 7 B	30	Sept. 25	210	630	210	55	405	135	55	405	135	55	405	135	55	405	135	430	2,250	750	7
65	8	29	Sept. 19	180	540	180	63	428	143	63	428	143	62	427	142	62	427	142	430	2,250	750	7
188	8	29	Dec. 7	195	585	195	59	417	139	59	416	139	59	416	139	58	416	138	430	2,250	750	7
64	9 (w.) [e]	56	Sept. 19	200	600	200	58	413	138	58	413	138	57	412	137	57	412	137	430	2,250	750	7
76	9 (w.)	42	Sept. 24	190	570	190	60	420	140	60	420	140	60	420	140	60	420	140	430	2,250	750	7
189	9 (w.)	42	Dec. 8	200	600	200	58	413	138	58	413	138	57	412	137	57	412	137	430	2,250	750	7
30	10	47	July 19	190	570	190	60	420	140	60	420	140	60	420	140	60	420	140	430	2,250	750	7
73	10	53	Sept. 21	190	570	190	60	420	140	60	420	140	60	420	140	60	420	140	430	2,250	750	7
	Virginia:																					
24	1 A	64	July 13	200	600	200	58	413	138	58	413	138	57	412	137	57	412	137	430	2,250	750	7
78	1 A	65	Sept. 25	200	600	200	58	413	138	58	413	138	57	412	137	57	412	137	430	2,250	750	7
31	1 B	77	July 19	180	540	180	62	427	142	62	427	142	63	428	143	63	428	143	430	2,250	750	7
69	1 A	67	Sept. 21	200	600	200	58	413	138	58	413	138	57	412	137	57	412	137	430	2,250	750	7
186	1 A	67	Dec. 6	190	570	190	60	420	140	60	420	140	60	420	140	60	420	140	430	2,250	750	7
59	1 A	68	Sept. 17	200	600	200	58	413	138	58	413	138	57	412	137	57	412	137	430	2,250	750	7
183	1 A	68	Dec. 5	190	570	190	60	420	140	60	420	140	60	420	140	60	420	140	430	2,250	950	7
158	2	69	Nov. 17	230	920	......	37	520	......	36	520	......	36	520	......	36	520	......	375	3,000	(d)	8
171	2 (w.)	70	Nov. 27	180	720	......	49	570	......	49	570	......	49	570	......	48	570	......	375	3,000	(b)	8
172	2 (w.)	70	....do....	180	720	......	80	570	......	80	570	......	80	570	......	80	570	......	500	3,000	(b)	6
92	2 B	63	Oct. 6	180	540	180	63	428	143	63	428	143	62	427	142	62	427	142	430	2,250	750	7
178	2 B	63	Dec. 1	195	585	195	59	417	139	59	416	139	59	416	139	58	416	138	430	2,250	750	7
52	2 B	69	Sept. 15	200	800	......	58	550	......	58	550	......	57	550	......	57	550	......	430	3,000	......	7
32	2 B (w.)	70	July 20	200	600	200	58	413	138	58	413	138	57	412	137	57	412	137	430	2,250	750	7
33	3	61	....do....	230	690	230	50	390	130	50	390	130	50	390	130	50	390	130	430	2,250	750	7
91	3	61	Oct. 5	250	750	250	45	375	125	45	375	125	45	375	125	45	375	125	430	2,250	750	7
58	3	88	Aug. 9	250	750	250	45	375	125	45	375	125	45	375	125	45	375	125	430	2,250	750	7
40	3	88	Sept. 5	240	720	240	48	383	128	48	383	128	47	382	127	47	382	127	430	2,250	750	7
34	4	62	July 23	190	570	190	60	420	140	60	420	140	60	420	140	60	420	140	430	2,250	750	7
	West Virginia:																					
159	4 (w.)	44	Nov. 17	210	840	......	42	540	......	41	540	......	41	540	......	41	540	......	375	3,000	(b)	8
160	4	44	Nov. 19	200	800	......	75	550	......	75	550	......	75	550	......	75	550	......	500	3,000	(d)	6
35	4 B	40	July 23	200	600	200	58	413	138	58	413	138	57	412	137	57	412	137	430	2,250	750	7
53	4 B (w.)	44	Sept. 15	200	800	......	58	550	......	58	550	......	57	550	......	57	550	......	430	3,000	......	7
74	4 B (w.)	46	Sept. 22	190	570	190	60	420	140	60	420	140	60	420	140	60	420	140	430	2,250	750	7

[a] Details of origin of coal samples can be found in Bull. U. S. Geol. Survey No. 290, 1906.
[b] Pig iron used from car 131943.
[c] Plus 10 per cent pitch.
[d] Pig iron used from car 27633.
[e] Plus 5 per cent pitch.

Cupola tests of coke from coals received in 1905—Continued.

Cupola test No.	Designation of coke.		Date.	Charges (pounds).																		Ratio iron to coke.
	Field No. of coal.	Coke test No.		Coke bed.	Pig iron.	Scrap.	Coke.	Pig iron.	Scrap.	Coke.	Pig iron.	Scrap.	Coke.	Pig iron.	Scrap.	Coke.	Pig iron.	Scrap.	Total.			
																			Coke.	Pig iron.	Scrap.	
1	2	3	4	5	6	7	8	9	10	11	12	13	14	15	16	17	18	19	20	21	22	23
	West Virginia—Con.																					
86	4 B (w.)	46	Oct. 1	190	570	190	60	420	140	60	420	140	60	420	140	60	420	140	430	2,250	750	7
20	13 and 14	23	July 7	190	570	190	60	420	140	60	420	140	60	420	140	60	420	140	430	2,250	750	7
51	15	36	Sept. 14	220	880	......	53	530	......	53	530	......	52	530	......	52	530	......	430	3,000	......	7
49	15	43	Sept. 12	220	880	......	53	530	......	53	530	......	52	530	......	52	530	......	430	3,000	......	7
167	15	36	Nov. 23	230	920	......	37	520	......	36	520	......	36	520	......	36	520	......	375	3,000	(a)	8
168	15	36	Nov. 24	230	920	......	68	520	......	68	520	......	67	520	......	67	520	......	500	3,000	(a)	6
182	15	43	Dec. 4	200	600	200	58	413	138	58	413	138	57	412	137	57	412	137	430	2,250	750	7
169	16	45	Nov. 24	180	720	......	49	570	......	49	570	......	49	570	......	48	570	......	375	3,000	(a)	8
170	16	45	Nov. 26	190	760	......	78	560	......	78	560	......	77	560	......	77	560	......	500	3,000	(a)	6
50	16 B	45	Sept. 14	190	760	......	60	560	......	60	560	......	60	560	......	60	560	......	430	3,000	......	7
36	16 A	73	July 24	190	570	190	60	420	140	60	420	140	60	420	140	60	420	140	430	2,250	750	7
37	16 B (w.)	48	....do...	190	570	190	60	420	140	60	420	140	60	420	140	60	420	140	430	2,250	750	7
77	16 B (w.)	49	Sept. 24	170	510	170	65	435	145	65	435	145	65	435	145	65	435	145	430	2,250	750	7
181	16 B (w.)	49	Dec. 4	195	585	195	59	417	139	59	416	139	59	416	139	58	416	138	430	2,250	750	7
38	17 (w.)	60	July 25	210	630	210	55	405	135	55	405	135	55	405	135	55	405	135	430	2,250	750	7
39	18	74	....do...	220	660	220	52	397	132	52	397	132	53	398	133	53	398	133	430	2,250	750	7
46	18	78	Sept. 11	200	600	200	58	413	138	58	413	138	57	412	137	57	412	137	430	2,250	750	7
45	19	79	Sept. 10	190	570	190	60	420	140	60	420	140	60	420	140	60	420	140	430	2,250	750	7
62	19	83	Aug. 13	190	570	190	60	420	140	60	420	140	60	420	140	60	420	140	430	2,250	750	7
41	19	83	Sept. 5	190	570	190	60	420	140	60	420	140	60	420	140	60	420	140	430	2,250	750	7
43	20 A (w.)	84	Sept. 6	220	660	220	53	398	133	53	398	133	52	397	132	52	397	132	430	2,250	750	7
63	20 A (w.)	84	Aug. 13	220	660	220	53	398	133	53	398	133	52	397	132	52	397	132	430	2,250	750	7
90	20 A	80	Oct. 5	240	720	240	48	383	128	48	383	128	47	382	127	47	382	127	430	2,250	750	7
177	20 A	80	Dec. 1	200	600	200	58	413	138	58	413	138	57	412	137	57	412	137	430	2,250	750	7
71	20 A (w.)	87	Aug. 18	230	690	230	50	390	130	50	390	130	50	390	130	50	390	130	430	2,250	750	7
42	20 A (w.)	87	Sept. 6	210	630	210	55	405	135	55	405	135	55	405	135	55	405	135	430	2,250	750	7
44	21	82	Sept. 8	180	540	180	63	428	143	63	428	143	62	427	142	62	427	142	430	2,250	750	7
72	21 (w.)	91	Aug. 20	200	600	200	58	413	138	58	413	138	57	412	137	57	412	137	430	2,250	750	7
88	21 (w.)	91	Aug. 29	190	570	190	60	420	140	60	420	140	60	420	140	60	420	140	430	2,250	750	7

a Pig iron used from car 131943.

Cupola tests of coke from coals received in 1905—Continued.

Cupola test No.	Designation of coke: Field No. of coal.	Designation of coke: Coke test No.	Analysis of coke (per cent).[a] Moisture.	Volatile matter.	Fixed carbon.	Ash.	Sulphur: In coke.	Sulphur: In ash.	Phosphorus.	Specific gravity.	Fluidity strip (per cent), full.	Maximum blast pressure (ounces).	Record of melt. Pounds of iron: Poured.	Pounds of iron: Additional melted.	Pounds of iron: Total.	Melting rate: Per hour (pounds).	Melting rate: Increase or decrease.	Recovered (pounds): Iron.	Recovered (pounds): Coke.	Melting loss (per cent).	Melting ratio: Iron to coke.	Melting ratio: Increase or decrease.	Coke bed: Increase (+) or decrease (−) (pounds).	Coke bed: Height above top of tuyeres (inches).
1	2	3	24	25	26	27	28	29	30	31	32	33	34	35	36	37	38	39	40	41	42	43	44	45
19	Connellsville coke		0.18	0.32	88.75	10.75	0.87	0.033	0.018	1.92	(b)	$7\frac{3}{4}$	2,470		2,470	5,489		283	20	8.2	6.02			
	Illinois:																							
54	11 D (w.)	5	1.19	.93	85.97	11.91	1.44	.135	.0065	1.87	99.9	7	1,874	490	2,364	4,728		418	71	7.23	6.58			
21	13 (w.)	2	4.69	1.68	82.08	11.64	1.27	.15	.007	1.85	99.9	7	822	860	1,682	2,925		1,064	110	8.46	5.26			
93	13	3	2.73	1.36	79.30	16.61	1.77	.10	.0162	1.90	97.22	7	1,770	462	2,232	5,356		606	71	5.4	6.22			
94	16	10	2.14	1.46	83.96	12.44	1.02	.05	.0076	1.85	81.94	7	1,230	578	1,808	3,874		958	59	7.80	4.87			
	Indiana:																							
82	4 (w.)	9	.55	.38	85.91	13.16	2.06	.16		1.86	99.9	7	1,568	347	1,915	3,930		921	57	5.47	5.13			
83	5	8	.76	.54	81.29	17.41	4.21	.20		1.91	99.9	7	1,562	605	2,167	4,642		611	62	7.4	5.89			
187	5	8	.76	.54	81.29	17.41	4.21	.20		1.91	93.05	7	1,622	145	1,767	3,029		920	47	10.43	3.90			
48	7 A (w.)	13	1.13	2.35	83.23	13.29	2.69	.07		1.85	90.28	7	1,761	719	2,480	4,022		258	67	6.55	6.83			
175	7 A (w.)	13	1.13	2.35	83.23	13.29	2.69	.07		1.85	94.44	7	2,247	403	2,650	5,483	Inc.	22	65	10.93	7.26	Inc.	c+45	21.4
173	9	17	.68	2.85	78.44	18.03	3.50	.210		1.84	94.44	7	782	235	1,017	2,653		1,836	59	4.90	3.22			
174	9	17	.68	2.85	78.44	18.03	3.50	.210		1.84	88.88	7	1,854	276	2,130	3,651		650	44	7.33	4.67			
81	9 B (w.)	18	.91	.97	84.60	13.52	2.24			1.84	99.9	7	1,834	279	2,113	4,372		717	66	5.67	5.80			
185	9 B (w.)	18	.91	.97	84.60	13.52	2.24			1.84	94.44	7	1,827	363	2,190	4,106	Dec.	608	48	6.73	5.73	Dec.	c+25	17.9
22	11	51	1.55	1.66	84.09	12.70	1.34	.04	.042	1.83	99.9	7	1,364	357	1,721	1,912	(d)	899	51	12.66	4.54			
184	11	51	1.55	1.66	84.09	12.70	1.34	.04	.042	1.83	99.9	7	2,163	253	2,416	4,832	Inc.	233	49	11.7	6.34	Inc.	c+15	16.2
	Kentucky:																							
29	1 C	71	1.32	1.53	84.68	12.47	.96	.07	.044	1.88	97.2	7	1,639	450	2,089	2,507		773	35	4.60	5.29			
26	1 B	76	.93	1.25	91.40	6.42	1.05	.04	.03	1.94	95.83	7	1,970	284	2,254	5,009		475	30	9.03	5.64			
27	5	75	.30	1.21	93.26	5.23	.41	.025	.012	1.84	94.44	7	1,885	482	2,367	3,737		552	64	2.70	6.47			
28	6	90	1.64	1.69	92.26	4.41	.37	.05	.0033	1.78	99.10	7	1,624	290	1,914	3,589		845	43	8.03	4.95			
89	6	90	1.64	1.69	92.26	4.41	.37	.05	.0033	1.78	98.61	7	1,872	247	2,119	4,384		709	77	5.73	6.00			
67	6	86	2.81	1.27	91.93	3.99	.40	.02	.0021	1.79	99.30	7	1,885	314	2,199	4,123		490	52	10.36	5.82			
47	7	85	.23	2.16	82.97	14.64	3.16	.01		1.83	95.83	7	2,120	529	2,649	4,967		209	59	4.73	7.14			
55	7	85	.23	2.16	82.97	14.64	3.16	.01		1.83	97.91	7	1,849	377	2,226	5,136		435	62	11.3	6.05			
	Maryland:																							
75	1 (w.)[e]	58	.27	.88	87.47	11.38	.95	.09	.0278	1.91	99.9	7	1,748	326	2,074	3,969		732	114	6.47	6.56			

[a] For chemical analyses of coals from which these cokes were made, see pp. 27-35.
[b] Ran up well.
[c] Bed rearranged.
[d] Trouble with iron notch accounts for long time between ladles, consequently melting rate is low.
[e] Plus 10 per cent pitch.

Cupola tests of coke from coals received in 1905—Continued.

Cupola test No.	Designation of coke. Field No. of coal.	Designation of coke. Coke test No.	Analysis of coke (per cent). Moisture.	Volatile matter.	Fixed carbon.	Ash.	Sulphur. In coke.	Sulphur. In ash.	Phosphorus.	Specific gravity.	Fluidity strip (per cent), full.	Maximum blast pressure (ounces).	Record of melt. Pounds of iron. Poured.	Pounds of iron. Additional melted.	Pounds of iron. Total.	Melting rate. Per hour (pounds).	Melting rate. Increase or decrease.	Recovered (pounds). Iron.	Recovered (pounds). Coke.	Melting loss (per cent).	Melting ratio. Iron to coke.	Melting ratio. Increase or decrease.	Coke bed. Increase (+) or decrease (−) (pounds).	Coke bed. Height above top of tuyeres (inches).
1	2	3	24	25	26	27	28	29	30	31	32	33	34	35	36	37	38	39	40	41	42	43	44	45
	Ohio:																							
23	5	22	0.87	0.98	86.15	12.00	1.64	0.02	.0087	1.84	99.9	7	2,093	179	2,272	3,495		400	73	10.93	6.36			
80	6 A, 6 B (w)	66	.42	1.20	88.35	10.03	2.51	.08	.0045	1.82	98.61	7	1,888	431	2,319	5,797		385	74	9.86	6.51			
57	7 (w.)	94	.57	1.58	88.08	9.77	1.90		.0058	1.86	97.91	7	2,365	152	2,517	4,195		249	44	7.80	6.52			
70	7	89	.75	.98	85.33	12.94	2.32	.03		1.88	99.9	7	1,884	113	1,997	3,631		819	57	6.13	5.35			
56	8 A (w.)	93	2.46	1.76	86.05	9.73	1.88	.02		1.81	98.61	7	1,285	1,067	2,352	3,528		348	42	10.00	6.06			
165	9	72	1.80	1.08	84.43	12.69	3.06	.05		1.86	92.36	7	1,686	301	1,987	3,726		841	19	5.73	5.58			
166	9	72	1.80	1.08	84.43	12.69	3.06	.05		1.86	93.05	7	2,085	393	2,478	4,646		347	36	5.83	5.34			
	Pennsylvania:																							
68	5 B (w.)	26	.23	1.19	91.63	6.95	.81	.015	.0053	1.84	99.9	7	2,247	362	2,609	5,218		155	89	7.87	7.65			
180	5 B (w.)	26	.23	1.19	91.63	6.95	.81	.015	.0053	1.84	92.36	7	1,419	328	1,747	3,176	Dec.	1,067	89	6.20	5.12	Dec.	a+10	15.5
60	6	32	.34	.71	82.31	16.64	1.59		.0241	1.96	97.22	7	899	493	1,392	2,784		1,454	154	5.13	5.04			
85	6	41	.27	1.26	82.66	15.81	1.52	.11	.0187	1.91		7												
87	6	41	.27	1.26	82.66	15.81	1.52	.11	.0187	1.91	99.9	7	1,096	329	1,425	2,948		1,426	114	4.97	4.51			
84	6 A, 6 B (w.)	34	.24	.66	88.61	10.49	1.21	.035	.0162	1.92	99.9	7	1,710	139	1,849	3,362		1,028	86	4.13	5.38			
176	6 A, 6 B (w.)	34	.24	.66	88.61	10.49	1.21	.035	.0162	1.92	94.44	7	2,307	163	2,470	5,700	Inc.	218	100	10.40	7.48	Inc.	a−20	11.4
25	6 A, 6 B (w.)	38	.89	2.26	86.77	10.08	1.24	.045	.015	1.84	99.50	7	639	237	876	1,314		1,863	160	8.70	3.24			
61	6 A, 6 B (w.)	38	.89	2.26	86.77	10.08	1.24	.045	.015	1.84	99.9	7	2,253	410	2,663	4,993		71	82	8.87	7.65			
66	7 A, 7 B (w.)	33	.43	1.84	83.46	14.33	1.42	.03	.0369	1.83	97.22	7	1,912	552	2,464	5,244		223	100	10.43	7.47			
79	7 A, 7 B	30	.46	1.16	82.39	15.99	1.87	.04	.0366	1.92	97.22	7	1,941	317	2,258	4,671		489	102	8.43	6.88			
65	8	29	.91	2.16	88.99	7.94	.91	.10	.0049	1.76	98.61	7	1,939	565	2,504	5,181		228	81	9.07	7.20			
188	8	29	.91	2.16	88.99	7.94	.91	.10	.0049	1.76	93.05	7	2,256	257	2,513	5,799	Inc.	199	49	9.60	6.50	Dec.	a+15	16.33
64	9 (w.)[b]	56	.72	.61	86.02	12.65	1.53	.015	.007	1.94	97.22	7	1,509	382	1,891	3,545		934	132	5.83	6.34			
76	9 (w.)	42	.54	1.21	86.84	11.41	1.06	.04	.0101	1.99	98.61	7	1,808	272	2,080	4,160		729	94	6.37	6.19			
189	9 (w.)	42	.54	1.21	86.84	11.41	1.06	.04	.0101	1.99		7	1,953	390	2,343	4,016	Dec.	347	82	10.30	6.73	Inc.	a+10	15.5
30	10	47	.39	1.14	90.40	8.07	1.00	.010	.008	1.85	97.91	7	1,578	750	2,328	3,581		400	74	9.06	6.54			
73	10	53	.36	1.14	89.93	8.57	1.05	.03	.0081	1.92	98.61	7	1,950	808	2,258	5,018		521	104	7.37	6.92			
	Virginia:																							
24	1 A	64	1.52	.99	89.20	8.29	.88	.07	.0036	1.80	95.83	7	1,418	802	2,220	3,098		485	46	9.83	5.78			
78	1 A	65	1.23	1.67	89.24	7.86	.94	.025	.0041	1.79	97.22	7	1,783	400	2,183	4,366		625	87	6.40	6.36			
31	1 B	77	.20	.80	91.52	7.48	1.02	.04	.005	1.87	98.60	7	2,253	200	2,453	4,460		322	58	7.50	6.57			
69	1 A	67	.21	.89	90.99	7.91	1.01	.03	.004	1.83	97.22	7	1,373	454	1,827	3,780		965	60	6.93	4.94			
186	1 A	67	.21	.89	90.99	7.91	1.01	.03	.004	1.83	99.9	7	2,007	293	2,300	4,182	Inc.	261	59	11.30	6.20	Inc.	a−10	12.4

59	1 A	68	.30	1.16	90.85	7.69	.97	.04	.004	1.81	99.9	7	1,816	706	2,522	4,881		261	55	7.23	6.72		
183	1 A	68	.30	1.16	90.85	7.69	.97	.04	.004	1.81	94.44	7	2,019	295	2,314	4,207	Dec.	391	38	9.83	5.90		
158	2	69	.69	.93	90.33	8.05	.65	.07	.0026	1.85	97.22	7	2,153	337	2,490	4,819		318	43	6.40	7.50	Dec. a—10	12.4
171	2 (w.)	70	.45	1.23	92.25	6.07	.69	.04	.0026	1.87	91.67	7	2,256	286	2,542	5,101		255	58	6.76	8.02		
172	2 (w.)	70	.45	1.23	92.25	6.07	.69	.04	.0026	1.87	94.44	7	2,475	205	2,680	5,956		122	107	6.60	6.82		
92	2 B	63	.25	1.08	91.25	7.42	.68	.008	.0026	1.87	94.44	7	1,882	130	2,012	3,658		786	89	6.73	5.90		
178	2 B	63	.25	1.08	91.25	7.42	.68	.008	.0026	1.87	97.22	7	1,900	514	2,414	5,003	Inc.	248	84	11.27	6.98	Inc. a+15	16.2
52	2 B	69	.69	.93	90.33	8.05	.65	.07	.0026	1.85	99.9	7	1,989	485	2,474	4,948		301	52	7.50	6.54		
32	2 B (w.)	70	.45	1.23	92.25	6.07	.69	.04	.0026	1.87	99.3	7	2,104	126	2,230	4,181		578	56	6.40	5.96		
33	3	61	.29	1.21	92.60	5.90	.61	.085	.0011	1.93	95.10	7	1,584	807	2,391	4,947		255	93	11.80	7.09		
91	3	61	.29	1.21	92.60	5.90	.61	.085	.0011	1.93	99.9	7	2,422	176	2,598	5,028		288	70	3.80	7.22		
58	3	88	.16	1.26	91.85	6.73	.55	.07	.006	1.87	94.44	7	1,710	490	2,200	4,551		636	104	5.46	6.75		
40	3	88	.16	1.26	91.85	6.73	.55	.07	.006	1.87	99.9	7	1,761	310	2,071	3,358		683	108	8.20	6.43		
34	4	62	.16	1.14	92.90	5.80	.42	.07	.0046	1.84	99.3	7	2,356	122	2,478	4,130		287	33	7.83	6.24		
	West Virginia:																						
159	4 (w.)	44	.60	1.20	87.04	11.16	.72	.010	.0186	1.96	95.83	7	1,433	282	1,715	3,118		988	74	9.90	5.70		
160	4	44	.60	1.20	87.04	11.16	.72	.010	.0186	1.96	99.09	7	2,188	254	2,442	4,726		316	66	6.07	5.63		
35	4 B	40	.35	.68	87.01	12.96	.82	.010	.014	1.92	99.4	7	2,107	305	2,412	4,256		323	88	8.83	7.05		
53	4 B (w.)	44	.60	1.20	87.04	11.16	.72	.10	.0186	1.96	99.9	7	2,106	332	2,438	5,851		422	72	4.67	6.53		
74	4 B (w.)	46	.27	1.37	86.98	11.38	.78	.010	.0112	1.88	99.9	7	1,954	419	2,373	4,315		360	119	8.90	7.63		
86	4 B (w.)	46	.27	1.37	86.98	11.38	.78	.010	.0112	1.88	99.9	7	1,286	279	1,565	3,354		1,259	147	5.87	5.53		
20	13 and 14	23	.43	1.37	94.20	4.00	.84	.02	.0018	1.85	99.4	7	2,143	200	2,343	3,905		383	56	9.13	6.26		
51	15	36	.45	.78	88.70	10.07	2.09	.07		1.90	99.9	7	2,380	189	2,569	5,315		214	88	7.23	7.51		
49	15	43	.26	1.89	87.30	10.55	2.26	.24	.0153	1.93	98.61	7	1,645	335	1,980	2,829		891	106	4.63	6.11		
167	15	36	.45	.78	88.70	10.07	2.09	.07		1.90	95.14	7	1,495	183	1,678	3,248		1,252	66	2.33	5.43		
168	15	36	.45	.78	88.70	10.07	2.09	.07		1.90	96.52	7	2,196	155	2,351	4,596		474	87	5.83	5.69		
182	15	43	.26	1.89	87.30	10.55	2.26	.24	.0153	1.93	97.22	7	1,825	317	2,142	5,588	Inc.	612	127	8.20	7.07	Inc. a—20	11.4
169	16	45	.40	1.55	85.61	12.44	1.23	.51	.0218	1.95	90.97	7	1,296	397	1,693	2,539		1,174	42	4.43	5.08		
170	16	45	.40	1.55	85.61	12.44	1.23	.55	.0218	1.95		7	2,379	179	2,558	5,292		270	55	5.73	5.75		
50	16 B	45	.40	1.55	85.61	12.44	1.23	.51	.0218	1.95	95.83	7	1,579	512	2,091	5,018		590	103	10.63	6.39		
36	16 A	73	.54	1.31	89.07	9.08	.81	.06	.0226	1.92	95.83	7	1,937	481	2,418	4,396		256	84	10.86	6.99		
37	16 B (w.)	48	.37	1.18	89.87	8.58	.91	.04	.0166	1.87	95.1	8	1,591	554	2,145	2,798		539	71	10.53	5.97		
77	16 B (w.)	49	.38	2.35	88.91	8.36	.89	.010	.0133	1.84	97.22	7	2,081	371	2,452	5,073		344	83	6.80	7.06		
181	16 B (w.)	49	.38	2.35	88.91	8.36	.89	.010	.0133	1.84	95.14	7	2,089	239	2,328	4,656	Dec.	485	49	6.23	6.11	Dec. a+25	18.1
38	17 (w.)	60	.07	.63	91.36	7.94	1.04	.015	.0047	1.91	93.8	7½	1,706	404	2,110	3,332		611	106	9.30	6.51		
39	18	74	.63	.97	89.54	8.86	.54	.03	.0058	1.93	99.9	7	2,163	260	2,423	4,276		306	70	9.03	6.73		
46	18	78	.69	1.19	89.47	8.65	.53	.02	.0037	1.87	98.61	7	2,135	310	2,445	3,965		315	103	8.00	7.48		
45	19	79	.38	1.68	89.96	7.98	.77	.02	.0026	1.98	98.61	7	2,187	298	2,485	4,119		202	64	10.40	6.79		
62	19	83	.45	.55	91.57	7.43	.82	.01	.0030	1.94	99.30	7	2,312	132	2,444	6,110		184	86	12.40	7.10		
41	19	83	.45	.55	91.57	7.43	.82	.01	.0030	1.94	91.67	7	1,850	508	2,358	4,287		409	83	7.77	6.79		
43	20 A (w.)	84	.29	.46	91.73	7.52	.90	.04	.0044	1.85	99.9	7	2,211	165	2,376	4,193		453	82	5.70	6.82		
63	20 A (w.)	84	.29	.46	91.73	7.52	.90	.04	.0044	1.85	96.53	7	1,984	238	2,222	4,444		503	106	9.16	6.86		
90	20 A	80	.17	1.08	89.01	9.74	1.10	.05	.004	1.80	99.9	7	2,136	375	2,511	5,022		204	85	9.50	7.28		
177	20 A	80	.17	1.08	89.01	9.74	1.10	.05	.004	1.80	80.55	7	905	352	1,257	2,285	Dec.	1,540	131	6.77	4.20	Dec. a—40	8.5
71	20 A (w.)	87	.17	.81	92.29	6.73	.85	.03	.0036	1.90	99.9	7	1,912	144	2,056	3,628		727	72	7.23	5.74		
42	20 A (w.)	87	.17	.81	92.29	6.73	.85	.03	.0036	1.90	91.67	7	1,729	345	2,074	4,610		657	113	8.97	6.54		
44	21	82	.24	.81	91.23	7.72	.98	.03	.0027	1.86	99.9	7	1,654	557	2,211	4,574		557	93	7.73	6.56		
72	21 (w.)	91	.55	1.03	93.16	5.26	.76		.0027	1.87	95.83	7	1,989	182	2,171	4,491		579	77	8.33	6.15		
88	21 (w.)	91	.55	1.03	93.16	5.26	.76		.0027	1.87	98.61	6¾	1,881	432	2,313	4,477		503	68	6.13	6.39		

[a] Bed rearranged.

[b] Plus 5 per cent pitch.

Cupola tests of coke from coals received in 1905—Continued.

Cupola test No.	Designation of coke. Field No. of coal.	Designation of coke. Coke test No.	Record of melt—Continued. Blast on at—	Iron running.	1. Lbs.	1. At—	2. Lbs.	2. At—	3. Lbs.	3. At—	4. Lbs.	4. At—	5. Lbs.	5. At—	6. Lbs.	6. At—	7. Lbs.	7. At—	8. Lbs.	8. At—	9. Lbs.	9. At—
1	2	3	46	47	48	49	50	51	52	53	54	55	56	57	58	59	60	61	62	63	64	65
19	Connellsville coke		10.57 a. m.	11.03	175	11.07	115	11.11	185	11.13	150	11.14	220	11.16	150	11.18	225	11.19	155	11.22	255	11.2
	Illinois:																					
54	11 D (w.)	5	11.15 a. m.	11.26	39	11.29	72	11.31	103	11.37	96	11.37½	72	11.41	92	11.41½	89	11.42	65	11.43	89	11.43½
21	13 (w.)	2	9.40 a. m.	9.55	79	10.02	29	10.03	70	10.07	57	10.09	75	10.11	63	10.12	61	10.13	53	10.15	53	10.16
93	13	3	10.25 a. m.	10.35	90	10.40	54	10.40½	111	10.43	91	10.43½	31	10.44	118	10.46	93	10.46½	70	10.47	124	10.49
94	16	10	10.31 a. m.	10.47	88	10.55	107	10.55½	86	10.57	93	10.58	93	10.59	85	11.00	83	11.01	94	11.01½	71	11.03
	Indiana:																					
82	4 (w.)	9	2.25 p. m.	2.33	51	2.36	78	2.38	93	2.41	112	2.45	116	2.45½	117	2.46	106	2.50	115	2.50½	122	2.51
83	5	8	2.34 p. m.	2.45	145	2.51	121	2.56	146	2.56½	100	2.57	91	3.00	102	3.00½	120	3.01	89	3.05	99	3.05½
187	5	8	10.46 a. m.	10.58	28	11.01	102	11.04	96	11.08	37	11.08½	78	11.12	92	11.12½	62	11.13	82	11.16	94	11.16½
48	7 A (w.)	13	10.15 a. m.	10.25	101	10.32	28	10.32½	70	10.38	76	10.38½	88	10.39	64	10.41	66	10.41½	82	10.42	88	10.44
175	7 A (w.)	13	10.47 a. m.	10.52	68	10.56	109	10.59	85	11.01	87	11.01½	43	11.02	85	11.04	95	11.04½	88	11.05	85	11.07
173	9	17	11.07 a. m.	11.18	97	11.25	96	11.30	96	11.30½	85	11.31	79	11.36	91	11.36½	88	11.37	63	11.40	74	11.40½
174	9	17	3.45 p. m.	3.56	90	4.05	88	4.05½	91	4.06	94	4.09	110	4.09½	90	4.10	82	4.14	93	4.14½	92	4.15
81	9 B (w.)	18	2.55 p. m.	3.06	82	3.10	122	3.13	41	3.13½	102	3.16	62	3.16½	145	3.20	111	3.20½	102	3.21	138	3.24
185	9 B (w.)	18	10.52 a. m.	11.00	24	11.03	87	11.07	99	11.11	75	11.11½	44	11.12	94	11.16	69	11.16½	82	11.17	118	11.19
22	11	51	2.44 p. m.	2.58	77	3.01	99	3.09	72	3.13	106	3.27	68	3.29	96	3.34	103	3.36	92	3.37	87	3.38
184	11	51	3.47 p. m.	3.55	91	4.00	59	4.00½	92	4.03	60	4.04	106	4.05	78	4.08	80	4.08½	96	4.09	91	4.10
	Kentucky:																					
29	1 C	71	9.26 a. m.	9.33	68	9.40	66	9.42	55	9.43	92	9.44	91	9.45	104	9.47	78	9.49	81	9.50	82	9.52
26	1 B	76	2.18 p. m.	2.31	85	2.35	79	2.37	93	2.38	113	2.39	63	2.40	95	2.41	108	2.41½	108	2.42	93	2.44
27	5	75	9.09 a. m.	9.19	53	9.24	180	9.26	56	9.28	101	9.29	107	9.30	93	9.31	97	9.33	105	9.34	88	9.35
28	6	90	3.09 p. m.	3.18	77	3.25	85	3.27	88	3.28	91	3.29	112	3.31	91	3.32	84	3.33	105	3.34	79	3.35
89	6	90	10.41 a. m.	10.51	101	10.55	100	10.57	98	11.00	89	11.01	74	11.01½	97	11.03	97	11.03½	66	11.04	95	11.06
67	6	86	9.52 a. m.	9.56	47	10.02	62	10.08	87	10.08½	78	10.09½	93	10.10	97	10.11	61	10.12	100	10.12½	101	10.13
47	7	85	3.20 p. m.	3.34	56	3.41	82	3.41½	64	3.42	96	3.42½	117	3.43	50	3.46	88	3.46½	80	3.47	54	3.49
55	7	85	4.24 p. m.	4.39	93	4.47	109	4.47½	103	4.48	64	4.50½	92	4.51	89	4.51½	102	4.52	87	4.54	98	4.54½
	Maryland:																					
75	1 (w.)[a]	58	10.35 a. m.	10.45	73	10.50	108	10.53	102	10.55	132	10.58	113	10.58½	105	10.59	114	11.01	40	11.01½	114	11.05
	Ohio:																					
23	5	22	1.51 p. m.	1.57	117	2.04	97	2.05½	108	2.07	83	2.09	89	2.10	101	2.11	92	2.12½	82	2.14	106	2.15
80	6 A, 6 B (w.)	66	10.8 a. m.	10.20	81	10.24	43	10.24½	132	10.27	50	10.27½	119	10.30	53	10.30½	108	10.31	121	10.33	85	10.33½
57	7 (w.)	94	3.57 p. m.	4.05	93	4.11	31	4.11½	112	4.14½	89	4.15	18	4.15½	98	4.20	85	4.20½	97	4.21	97	4.22
70	7	89	8.05 a. m.	8.12	91	8.20	107	8.20½	109	8.23½	90	8.24	94	8.24½	103	8.28	96	8.28½	56	8.29	64	8.29½
56	8 A (w.)	93	11.03 a. m.	11.16	81	11.35	92	11.35½	98	11.36	27	1.36½	78	11.44	69	11.45	46	11.45½	44	11.52	87	11.52½
165	9	72	3.31 p. m.	3.40	100	3.44	85	3.48	94	3.48½	46	3.49	73	3.52	101	3.52½	80	3.53	76	3.55	103	3.55½
166	9	72	11.18 a. m.	11.29	54	11.33	85	11.37	86	11.37½	76	11.38	79	11.42	85	11.42½	77	11.43	63	11.45	81	11.45½

	Pennsylvania:																					
68	5 B (w.)	26	2.31 p.m.	2.37	82	2.42	78	2.44	93	2.47	103	2.47½	54	2.48	96	2.50	111	2.50½	38	2.51	92	2.52
180	5 B (w.)	26	4.16 p.m.	4.26	21	4.30	69	4.33	59	4.33½	65	4.36	78	4.36½	86	4.37	59	4.41	77	4 4.41½	117	4.42
60	6	32	10.25 a.m.	10.40	46	10.45	85	10.50	94	10.50½	66	10.53	78	18.53½	77	10.56	98	10.56½	50	11.02	74	11.02½
85	6	41	1.10 p.m.	......	......	......	......	......	......	......	......	......	......	......	......	......	......	......	......	......	......	......
87	6	41	2.07 p.m.	2.17	55	2.20	69	2.23	29	2.26	90	2.26½	68	2.27	74	2.33	80	2.33½	74	2.34	66	2.36
84	6 A, 6 B (w.)	34	10.00 a.m.	10.09	91	10.14	115	10.17	106	10.18	98	10.21	130	10.21½	130	10.22	63	10.24	127	10.26	130	10.30
176	6 A, 6 B (w.)	34	3.25 p.m.	3.33	92	3.37	32	3.38	77	3.40	97	3.40½	82	3.42	89	3.42½	54	3.43	83	3.45	102	3.45½
25	6 A, 6 B (w.)	38	7.49 a.m.	8.07	8	8.18	52	8.22½	95	8.29	80	8.31	86	8.33	91	8.35	75	8.37	72	8.39	46	8.41
61	6 A, 6 B (w.)	38	2.54 p.m.	3.04	50	3.07	105	3.10	76	3.10½	83	3.14	122	3.14½	84	3.15	92	3.17	112	3.17½	116	3.18
66	7 A, 7 B (w.)	33	9.50 a.m.	9.59	38	10.03	77	10.05	72	10.05½	85	10.07	85	10.07½	82	10.08	67	10.10	80	10.10½	91	10.11
79	7 A. 7 B	30	3.04 p.m.	3.13	35	3.17	135	3.19	141	3.21	25	3.21½	115	3.24	148	3.24½	116	3.25	104	3.27	133	3.27½
65	8	29	11.35 a.m.	11.42	22	11.47	89	11.50	74	11.50½	79	11.52	96	11.52½	91	11.53	66	11.55	82	11.55½	80	11.56
188	8	29	3.34 p.m.	3.42	88	3.47	94	3.47½	30	3.48	78	3.50	86	3.50½	58	3.51	86	3.52	88	3.52½	71	3.53
64	9 (w.)[b]	56	9.02 a.m.	9.15	35	9.18	90	9.21	43	9.21½	80	9.25	82	9.25½	93	9.26	69	9.32	71	9.32½	87	9.33
76	9 (w.)	42	10.12 a.m.	10.25	47	10.28	95	10.31	41	10.31½	120	10.37	105	10.37½	130	10.38	118	10.41	116	10.41½	143	10.42
189	9 (w.)	42	3.40 p.m.	3.48	93	3.53	61	3.57	63	3.57½	34	3.58	68	4.01	80	4.01½	67	4.02	79	4.04	87	4.04½
30	10	47	9.19 a.m.	9.29	42	9.36	97	9.42	86	9.43	28	9.45	65	9.47	73	9.48	80	9 49	60	9.50	62	9.51
73	10	53	2.00 p.m.	2.09	74	2.12	102	2.14	110	2.17	105	2.17½	83	2.18	110	2.21	116	2.21½	108	2.23	110	2.23½
	Virginia:																					
24	1 A	64	8.53 a.m.	9.01	97	9.12[a]	73	9.15	77	9.18	95	9.19	93	9.20	95	9.21	91	9.22	89	9.23	93	9.24
78	1 A	65	10.01 a.m.	10.09	68	10.13	131	10.15	106	10.17	87	10.22	130	10.22½	136	10.23	88	10.26	136	10.26½	151	10.27
31	1 B	77	3.31 p.m.	3.37	83	3.45	75	3.48	81	3.49	102	3.50	114	3.51	79	3.52	91	3.54	104	3.55	81	3.56
69	1 A	67	10.22 a.m.	10.33	69	10.38	106	10.41	47	10.41½	81	10.42	47	10.42½	101	10.46	77	10.46½	56	10.47	103	10.49
186	1 A	67	3.49 p.m.	3.59	56	4.02	108	4.05	89	4.08	92	4.08½	77	4.09	86	4.13	103	4.13½	76	4.14	88	4.16
59	1 A	68	3.00 p.m.	3.10	69	3.14	63	3.17	98	3.20	78	3.20½	66	3.23	101	3.23½	86	3.25	106	3.25½	54	3.26
183	1 A	68	11.04 a.m.	11.10	80	11.19	89	11.23	89	11.23½	66	11.24	82	11.25	108	11.25½	66	11.26	68	11.28	87	11.28½
158	2	69	11.00 a.m.	11.06	85	11.13	103	11.13½	55	11.14	88	11.17	116	11.17½	112	11.18	93	11.20	100	11.20½	116	11.21
171	2 (w.)	70	10.48 a.m.	10.57	97	11.01	95	11.05	108	11.05½	102	11.06	96	11.07	118	11.07½	106	11.08	90	11.09	111	11.09½
172	2 (w.)	70	3.45 p.m.	3.55	40	3.59	62	4.02	116	4.02½	72	4.03	91	4.05	101	4.05½	128	4.06	76	4.08	99	4.08½
92	2 B	63	8.12 a.m.	8.22	85	8.27	52	8.27½	129	8.29	76	8.29½	123	8.34	135	8.34½	91	8.35	121	8.29	141	8.39½
178	2 B	63	3.52 p.m.	3.59	101	4.03	100	4.07	114	4.09	97	4.09½	57	4.10	88	4.12	95	4.12½	95	4.13	87	4.16
52	2 B	69	7.42 a.m.	7.54	47	7.57	65	7.57	88	8.04	83	8.04½	66	8.05	83	8.09	77	8.09½	74	8.10	74	8.12
32	2 B (w.)	70	10.19 a.m.	10.29	95	10.34	76	10.34½	90	10.35	80	10.36	108	10.37	97	10.39	93	10.40	110	10.41	94	10.42
33	3	61	4.03 p.m.	4.12	85	4.15	103	4.19	98	4.20	94	4.21	88	4.22	84	4.23	73	4.24	71	4.25	81	4.25½
91	3	61	3.30 p.m.	3.37	132	3.45	104	3.45½	111	3.47	135	3.47½	92	3.51	110	3.51½	151	3.52	94	3.54	112	3.54½
58	3	88	10.23 a.m.	10.36	102	10.45	107	10.45½	77	10.50½	74	10.51	84	10.51½	64	10.54	64	10.54½	83	10.55	62	10.56
40	3	88	11.14 a.m.	11.23	64	11.27	62	11.29	80	11.31	62	11.32	72	11.38	75	11.38½	95	11.39	55	11.41	92	11.41½
34	4	62	8.56 a.m.	9.01	104	9.08	101	9.10	105	9.11	101	9.13	100	9.14	113	9.16	89	9.18	92	9.18½	101	9.19
	West Virginia:																					
159	4 (w.)	44	3.21 p.m.	3.30	36	3.35	92	3.38	140	3.45	74	3.45½	98	3.46	130	3.48	73	3.49½	95	3.50	115	3.51
160	4	44	10.51 a.m.	11.01	36	11.06	52	11.08	29	11.08½	120	11.14	100	11.14½	126	11.16	112	11.16½	122	11.19	112	11.19½
35	4 B	40	2.31 p.m.	2.38	104	2.48	102	2.50	106	2.50½	81	2.51	73	2.54	105	2.54½	99	2.55	91	2.55½	71	2.56½
53	4 B (w.)	44	9.54 a.m.	10.09	74	10.12	100	10.14	55	10.14½	92	10.16	99	10.16½	42	10.17	97	10.19	99	10.19½	119	10.20
74	4 B (w.)	46	8.18 a.m.	8.27	87	8.31	81	8.34	29	8.34½	70	8.40	54	8.41	88	8.42	65	8.42½	78	8.43	100	8.45
86	4 B (w.)	46	9.33 a.m.	9.45	48	9.50	100	9.52	138	9.54	36	9.54½	85	9.57½	104	9.58	108	10.00	89	10.00½	132	10.03
20	13 and 14	23	2.24 p.m.	2.38	48	2.41	105	2.44	110	2.46	65	2.47	100	2.48	78	2.49	93	2.49½	79	2.50	,57	2.50½
51	15	36	1.29 p.m.	1.43	95	1.48	94	1.51	107	1.51½	33	1.52	94	1.54	108	1.54½	87	1.55	100	1.57	113	1.57½
49	15	43	3.29 p.m.	3.44	30	3.49	99	3.54	112	3.54½	32	3.55	79	3.59	96	3.59½	69	4.00	74	4.04	96	4.04½
167	15	36	3.55 p.m.	4.02	35	4.06	93	4.09	97	4.09½	108	4.13	91	4.13½	112	4.14	146	4.23	97	4.23½	161	4.24
168	15	36	11.01 a.m.	11.11	88	11.15	90	11.18	67	11.18½	72	11.22	99	11.22½	89	11.23	64	11.28	99	11.28½	93	11.29

[a] Plus 10 per cent pitch.

[b] Plus 5 per cent pitch.

Cupola tests of coke from coals received in 1905—Continued.

Cupola test No.	Designation of coke.		Record of melt—Continued.																			
	Field No. of coal.	Coke test No.	Blast on at—	Iron running.	Weight and time of each ladle of melted iron.																	
					1.		2.		3.		4.		5.		6.		7.		8.		9.	
					Lbs.	At—	Lbs.	At—	Lbs.	At—	Lbs.	At—	Lbs.	At—	Lbs.	At—	Lbs.	At—	Lbs.	At—	Lbs.	At—
1	**2**	**3**	**46**	**47**	**48**	**49**	**50**	**51**	**52**	**53**	**54**	**55**	**56**	**57**	**58**	**59**	**60**	**61**	**62**	**63**	**64**	**65**
	West Virginia—Continued.																					
182	15	43	4.10 p. m.	4.20	35	4.24	93	4.28	71	4.28½	25	4.29	75	4.32	81	4.32½	76	4.33	68	4.34	78	4.34½
169	16	45	2.43 p. m.	2.53	38	2.56	104	2.59	99	3.04	95	3.04½	94	3.05	70	3.11	71	3.11½	87	3.12	58	3.19
170	16	45	10.57 a. m.	11.07	40	11.10	96	11.15	112	11.15½	79	11.16	95	11.17	103	11.17½	83	11.18	96	11.19	108	11.19½
50	16 B	45	8.23 a. m.	8.37	91	8.42	72	8.42½	100	8.44	57	8.44½	84	8.45	95	8.51	90	8.51½	78	8.53	87	8.53½
36	16 A	73	9.18 a. m.	9.26	98	9.32	61	9.32½	104	9.35	89	9.36	119	9.36½	109	9.37	85	9.41	95	9.42	90	9.44
37	16 B (w.)	48	2.45 p.m.	2.50	29	2.55	96	2.57	73	2.59	25	2.59½	92	3.02	71	3.03	64	3.03½	67	3.04	68	3.06
77	16 B (w.)	49	2.31 p.m.	2.38	101	2.42	120	2.44	117	2.46	92	2.50	113	2.50½	116	2.51	102	2.53	111	2.53½	119	2.54
181	16 B (w.)	49	11.08 a.m.	11.15	101	11.19	83	11.22	54	11.23	65	11.26	97	11.26½	33	11.27	112	11.30	107	11.30½	134	11.31
38	17 (w.)	60	9.32 a.m.	9.38	121	9.47	111	9.47½	83	9.50	79	9.51	76	9.52	58	9.53	63	9.54	63	9.56	58	9.58
39	18	74	3.15 p.m.	3.23	93	3.29	65	3.30	98	3.32	80	3.33	73	3.33½	82	3.36	84	3.37	73	3.38	97	3.39
46	18	78	10.20 a.m.	10.32	29	10.35	51	10.37	100	10.39	77	10.44	94	10.44½	79	10.45	78	10.46	83	10.46½	85	10.47
45	19	79	3.07 p.m.	3.17	30	3.23	90	3.25	13	3.25	75	3.27	71	3.27½	80	3.28	67	3.31	75	3.31½	79	3.32
62	19	83	9.51 a.m.	10.09	88	10.15	111	10.15½	107	10.16	85	10.17½	123	10.18	100	10.18½	77	10.20	101	10.20½	103	10.21
41	19	83	3.23 p.m.	3.34	90	3.39	84	3.43	105	3.43½	49	3.44	86	3.45	106	3.45½	46	3.46	71	3.49	102	3.49½
43	20 A (w.)	84	3.28 p.m.	3.37	92	3.43	99	3.43½	34	3.44	82	3.46	96	3.46½	112	3.47	77	3.49	98	3.49½	81	3.50
63	20 A (w.)	84	3.30 p.m.	3.40	69	3.47	102	3.52	102	3.52½	98	3.53	59	3.53½	87	3.54	110	3.54½	100	3.55	83	3.57
90	20 A	80	10.27 a.m.	10.34	46	10.37	128	10.40	97	10.40½	89	10.44	120	10.44½	96	10.45	74	10.48	137	10.48½	99	10.49
177	20 A	80	10.54 a.m.	11.05	20	11.09	56	11.14	81	11.20	51	11.20½	71	11.22	81	11.22½	60	11.23	64	11.26	74	11.26½
71	20 A (w.)	87	10.56 a.m.	11.04	80	11.12	110	11.15½	81	11.16	76	11.17	74	11.20	99	11.21	90	11.22	92	11.22½	90	11.23½
42	20 A (w.)	87	10.32 a.m.	10.44	45	10.47	97	10.50	103	10.53	73	10.53½	73	10.59	86	10.59½	91	11.00	81	11.02	73	11.02½
44	21	82	11.00 a.m.	11.09	58	11.13	90	11.17	57	11.17½	66	11.22	78	11.22½	97	11.23	63	11.25	80	11.25½	88	11.26
72	21 (w.)	91	10.32 a.m.	10.40	91	10.49	115	10.50	106	10.50½	88	10.51	90	10.54	100	10.54½	88	10.55	92	10.55½	98	10.57
88	21 (w.)	91	3.39 p.m.	3.47	77	3.51	76	3.52	102	3.55½	100	3.56	66	3.59	98	3.59½	93	4.00	97	4.02	97	4.02½

Cupola tests of coke from coals received in 1905—Continued.

Cupola test No.	Designation of coke.		Record of melt—Continued. Weight and time of each ladle of melted iron—Continued.																					
	Field No. of coal.	Coke test No.	10.		11.		12.		13.		14.		15.		16.		17.		18.		19.		20.	
			Lbs.	At—	Lbs.	At—	Lbs.	At—	Lbs.	At—	Lbs.	At—	Lbs.	At—	Lbs.	At—	Lbs.	At—	Lbs.	At—	Lbs.	At—	Lbs.	At—
1	2	3	66	67	68	69	70	71	72	73	74	75	76	77	78	79	80	81	82	83	84	85	86	87
19	Connellsville coke	......	155	11.26	250	11.27	125	11.28	170	11.29	140	11.30												
	Illinois:																							
54	11 D (w.)	5	74	11.44	108	11.46	107	11.46½	87	11.47	93	11.48	101	11.48½	79	11.49	95	11.51	101	11.51½	76	11.52	75	11.55
21	13 (w.)	2	90	10.17	53	10.18	31	10.20	63	10.21	29	10.24	13	10.28½	3	10.29½								
93	13	3	90	10.49½	58	10.50	132	10.51	93	10.51½	60	10.52	125	10.54	90	10.54½	95	10.55	118	10.58	77	10.58½	50	11.00
94	16	10	73	11.03½	89	11.04	60	11.07	88	11.07½	76	11.08	44	11.15										
	Indiana:																							
82	4 (w.)	9	89	2.54	109	2.54½	120	2.55	78	2.59	105	2.59½	114	3.00	43	3.03								
83	5	8	111	3.06	88	3.08	118	3.08½	92	3.09	64	3.13	76	3.14										
187	5	8	65	11.17	79	11.20	96	11.20½	67	11.21	77	11.24	91	11.24½	67	11.25	71	11.29	90	11.29½	53	11.30	61	11.32
48	7 A (w.)	13	63	10.44½	92	10.45	87	10.47	56	10.48	92	10.50	77	10.50½	48	10.51	92	10.54	72	10.54½	77	10.55	52	10.56
175	7 A (w.)	13	90	11.07½	80	11.08	92	11.09	94	11.10	93	11.10½	93	11.11	84	11.12	96	11.12½	87	11.13	81	11.14	92	11.14½
173	9	17	13	11.41																				
174	9	17	91	4.16	94	4.16½	102	4.17	92	4.19	104	4.19½	98	4.20	73	4.24	92	4.24½	90	4.25	62	4.30	80	4.30½
81	9 B (w.)	18	114	3.24½	97	3.25	116	3.29	113	3.29½	118	3.30	132	3.34	112	3.34½	127	3.35						
185	9 B (w.)	18	131	11.19½	121	11.20	127	11.23	130	11.23½	137	11.24	63	11.25	81	11.28	74	11.28½	68	11.29	100	11.30	73	11.31
22	11	51	89	3.40	76	3.41	80	3.42	53	3.43	56	3.44	57	3.46	83	3.48	50	3.51	20	3.52				
184	11	51	97	4.10½	38	4.11	89	4.12	90	4.12½	57	4.13	83	4.15	94	4.15½	120	4.16	78	4.18	94	4.18½	122	4.19
	Kentucky:																							
29	1 C	71	56	9.55	73	9.55½	66	9.58	49	10.00	67	10.01	51	10.02	73	10.04	40	10.07	47	10.10	65	10.12	40	10.13
26	1 B	76	113	2.45	86	2.46	93	2.47	112	2.48	88	2.49	82	2.50	97	2.51	88	2.53	88	2.53½	102	2.54	82	2.55
27	5	75	94	9.36	111	9.37	84	9.39	84	9.40	97	9.41	72	9.41	79	9.44	75	9.46	63	9.47	68	9.48	81	9.50
28	6	90	88	3.37	99	3.39	67	3.40	72	3.41	76	3.42	64	3.43	68	3.44	105	3.45	61	3.47	53	3.49	59	3.50
89	6	90	94	11.06½	93	11.08	87	11.08½	109	11.10	85	11.10½	107	11.12	45	11.12½	96	11.14	64	11.14½	105	11.15	89	11.17
67	6	56	98	10.16	56	10.16½	107	10.17	94	10.18	102	10.18½	104	10.19	87	10.21½	96	10.23	69	10.23	106	10.25	14	10.25½
47	7	85	88	3.49½	67	3.50	95	3.51	58	3.51½	89	3.53	46	3.53½	91	3.54	90	3.55	41	3.55½	96	3.56	39	3.58
55	7	85	81	4.55	101	4.55½	75	4.57	88	4.57½	93	4.58	73	4.59	83	5.01½	87	5.02	88	5.02½	82	5.03	86	5.04
	Maryland:																							
75	1 (w.) [a]	58	83	11.05½	117	11.07	79	11.07½	117	11.10	79	11.10½	82	11.12	113	11.14½	109	11.15	68	11.16				
	Ohio:																							
23	5	22	90	2.17	97	2.19	106	2.20	89	2.22	79	2.23	107	2.24	97	2.26	73	2.27½	100	2.28	74	2.31	75	2.33
80	6 A, 6 B (w.)	66	114	10.34½	141	10.35	120	10.36½	108	10.37	122	10.38½	60	10.39	108	10.40	59	10.40½	81	10.42	97	10.43	86	10.44
57	7 (w.)	94	93	4.22½	87	4.23	87	4.26	81	4.26½	83	4.27	88	4.28	84	4.28½	88	4.29	92	4.30	84	4.30½	89	4.31
70	7	89	89	8.33	107	8.33½	87	8.34	104	8.35	88	8.35½	89	8.36	91	8.37	93	8.42	107	8.43	91	8.44	128	8.45
56	8 A (w.)	93	53	11.53	43	11.57	53	11.57½	53	11.58	52	11.58½	34	11.59	53	11.59½	64	12.00	29	12.00½	47	12.01	33	12.01½
165	9	72	89	3.56	92	3.59	97	3.59½	84	4.00	85	4.03	98	4.03½	84	4.04	78	4.09	96	4.09½	79	4.10	46	4.12
166	9	72	65	11.46	82	11.48	79	11.48½	99	11.49	88	11.50	83	11.50½	114	11.52	64	11.52½	105	11.53	113	11.56	85	11.56½

[a] Plus 10 per cent pitch.

Cupola tests of coke from coals received in 1905—Continued.

Cupola test No.	Designation of coke.		Record of melt—Continued. Weight and time of each ladle of melted iron—Continued.																					
	Field No. of coal.	Coke test No.	10.		11.		12.		13.		14.		15.		16.		17.		18.		19.		20.	
			Lbs.	At—	Lbs.	At—	Lbs.	At—	Lbs.	At—	Lbs.	At—	Lbs.	At—	Lbs.	At—	Lbs.	At—	Lbs.	At—	Lbs.	At—	Lbs.	At—
1	2	3	66	67	68	69	70	71	72	73	74	75	76	77	78	79	80	81	82	83	84	85	86	87
	Pennsylvania:																							
68	5 B (w.)	26	116	2.52½	86	2.54	96	2.54½	81	2.55	97	2.56	81	2.56½	125	2.57	100	2.58	82	2.58½	34	2.59	110	3.00
180	5 B (w.)	26	95	4.47	68	4.47½	117	4.48	88	4.53	56	4.53½	96	4.54	72	4.57	45	4.57½	85	4.58	66	4.59		
60	6	32	93	11.03	44	11.06	59	11.06½	35	11.10														
85	6	41																						
87	6	41	72	2.36½	71	2.37	58	2.39	71	2.39½	75	2.40	49	2.44	58	2.45	37	2.46						
84	6 A, 6 B (w.)	34	98	10.31	130	10.32	131	10.36	94	10.37	130	10.38	47	10.38½	90	10.43								
176	6 A, 6 B (w.)	34	109	3.46	88	3.47	114	3.47½	115	3.48	94	3.49	96	3.50	102	3.50½	94	3.51	108	3.52	107	3.52½	105	3.53
25	6 A, 6 B (w.)	38	34	8.49																				
61	6 A, 6 B (w.)	38	107	3.20	74	3.20½	97	3.22	108	3.22½	110	3.23	102	3.24	99	3.24½	108	3.27	78	3.27½	105	3.29	59	3.29½
66	7 A, 7 B (w.)	33	56	10.14	81	10.14½	72	10.15	85	10.16	73	10.16½	105	10.17	93	10.19	94	10.19½	64	10.20	85	10.21	95	10.21½
79	7 A, 7 B	30	128	3.28	109	3.31	125	3.31½	124	3.32	104	3.36	132	3.36½	103	3.37	88	3.41	76	3.42				
65	8	29	62	11.57	95	11.57½	68	11.58	81	11.59	75	11.59½	68	12.00	74	12.01	146	12.01½	72	12.02	85	12.04	136	12.04½
188	8	29	84	3.54	86	3.54½	79	3.55	86	3.56	89	3.56½	80	3.57	87	3.58	90	3.58½	78	3.59	89	4.00	83	4.00½
64	9 (w.) *a*	56	93	9.34	105	9.34½	130	9.35	101	9.37	101	9.42	113	9.42½	87	9.45½	87	9.46	42	9.47				
76	9 (w.)	42	138	10.45	127	10.45½	151	10.46	149	10.50	131	10.50½	76	10.51	121	10.55								
189	9 (w.)	42	102	4.05	127	4.08	121	4.08½	147	4.09	118	4.14	138	4.14½	164	4.15	55	4.15½	56	4.19	53	4.19½	56	4.20
30	10	47	74	9.52	106	9.53	53	9.54	71	9.55	85	9.56	63	9.59	90	10.01	68	10.02	57	10.03	78	10.04	70	10.06
73	10	53	111	2.25	88	2.25½	115	2.25	98	2.29	102	2.29½	104	2.32	102	2.32½	107	2.35	120	2.35½	85	2.36		
	Virginia:																							
24	1 A	64	89	9.26	80	9.28	63	9.29	81	9.30	84	9.32	98	9.33	56	9.41½	64	9.44						
78	1 A	65	79	10.29	116	10.29½	129	10.30	97	10.33	113	10.33½	100	10.34	71	10.38	45	10.39						
31	1 B	77	103	3.56½	101	3.57	71	3.58	97	3.58½	90	4.01	98	4.02	91	4.04	104	4.05	97	4.06	95	4.08	98	4.10
69	1 A	67	78	10.49½	84	10.50	97	10.52	80	10.52½	36	10.53	93	10.55	75	10.55½	30	10.56	73	11.01	38	11.02		
186	1 A	67	118	4.16½	93	4.20	88	4.20½	137	4.21	77	4.23	87	4.23½	121	4.24	82	4.25	87	4.25½	52	4.26	79	4.28
59	1 A	68	84	3.28	102	3.28½	52	3.29	81	3.31	95	3.31½	58	3.32	72	3.33	97	3.33½	51	3.34	69	3.35	92	3.35½
183	1 A	68	71	11.29	133	11.31	128	11.31½	118	11.32	85	11.34	70	11.34½	91	11.35	77	11.38	71	11.38½	91	11.39	75	11.40
158	2	69	86	11.23	104	11.23½	113	11.24	79	11.26	101	11.26½	117	11.27	76	11.28	95	11.28½	110	11.29	70	11.31	96	11.31½
171	2 (w.)	70	96	11.10	87	11.11	111	11.11½	93	11.12	82	11.13	109	11.13½	99	11.14	78	11.15	106	11.15½	97	11.16	67	11.17
172	2 (w.)	70	119	4.09	75	4.10	101	4.10½	120	4.11	76	4.12	101	4.12½	116	4.13	97	4.13½	91	4.14	99	4.14½	93	4.17
92	2 B	63	88	8.40	118	8.41	96	8.42	83	8.48	124	8.48½	137	8.49	78	8.53	137	8.54	68	8.55				
178	2 B	63	118	4.16½	101	4.17	138	4.17½	60	4.18	74	4.21	96	4.21½	83	4.22	106	4.25	65	4.25½	81	4.26	111	4.27
52	2 B	69	88	8.12½	111	8.13	71	8.14	98	8.14½	96	8.15	63	8.16	96	8.16½	109	8.17	54	8.19	83	8.19½	98	8.20
32	2 B (w.)	70	88	10.43	109	10.44	92	10.45	97	10.46	98	10.47	98	10.49	97	10.50	84	10.52	100	10.53	110	10.55	125	10.56
33	3	61	80	4.27	60	4.28	63	4.30	66	4.32	98	4.33	51	4.34	53	4.35	54	4.37	58	4.38	49	4.39	46	4.41
91	3	61	99	3.55	90	3.56	99	3.56½	132	3.58	100	3.58½	80	3.59	131	4.01	90	4.01½	142	4.02	142	4.04	56	4.04½
58	3	88	66	10.56½	79	10.57	56	10.58	80	10.58½	73	10.59	50	11.00½	84	11.01	59	11.02½	47	11.03	66	11.03½	90	11.05

40	3	88	75	11.42	88	11.44	76	11.44½	91	11.45	84	11.46	75	11.46½	85	11.48	92	11.48½	36	11.49	72	11.53	51	11.53½
34	4	62	104	9.20½	88	9.21	102	9.23	96	9.24	93	9.24½	83	9.27	87	9.27½	88	9.28	103	9.28½	89	9.29	101	9.30
	West Virginia:																							
159	4 (w.)	44	71	3.51½	92	3.52	86	3.59	63	3.59½	109	4.00	113	4.02	46	4.03	...	...	...	...	...	...	...	...
160	4	44	95	11.21	142	11.21½	84	11.22	86	11.22½	130	11.24	87	11.24½	89	11.25	114	11.26	83	11.26½	103	11.27	85	11.30
35	4 B	40	93	2.57	89	2.57½	98	2.58	66	2.59	84	2.59½	88	3.01	94	3.01	65	3.02½	86	3.03	76	3.03½	109	3.04
53	4 B (w.)	44	93	10.21	106	10.21½	104	10.22	98	10.23	101	10.23½	109	10.24	86	10.25	100	10.25½	109	10.26	98	10.27	107	10.27½
74	4 B (w.)	46	70	8.45½	59	8.46	100	8.47	72	8.47½	65	8.48	90	8.49	71	8.50	104	8.51	112	8.51½	72	8.56	150	8.56½
86	4 B (w.)	46	109	10.03½	72	10.08	138	10.08½	99	10.12	28	10.13	...	...	...	...	...	...	...	...	...	...	...	...
20	13 and 14	23	87	2.51	87	2.52	78	2.52½	93	2.53	90	2.55	82	2.56	87	2.57	92	2.58	74	2.59	84	3.00	75	3.02
51	15	36	69	1.58	83	1.59	115	1.59½	88	2.00	98	2.01	92	2.01½	111	2.02	89	2.02½	97	2.03	111	2.03½	105	2.04
49	15	43	71	4.05	69	4.09	99	4.09½	104	4.10	108	4.11	70	4.20	74	4.21½	102	4.22	59	4.24½	94	4.25	78	4.25½
167	15	36	106	4.24½	105	4.25	99	4.30	106	4.30½	107	4.31	32	4.33	...	...	...	...	...	...	...	...	...	...
168	15	36	59	11.30	93	11.31	100	11.32	56	11.33	101	11.33½	92	11.34	67	11.34½	102	11.35	96	11.37	105	11.37½	86	11.38
182	15	43	60	4.35	69	4.36	73	4.36½	67	4.37	69	4.38	75	4.38½	80	4.39	72	4.40	76	4.40½	143	4.41	151	4.42
169	16	45	55	3.19½	60	3.20	40	3.27	45	3.27½	52	3.28	92	3.29	45	3.29½	45	3.30	83	3.32	39	3.32½	23	3.33
170	16	45	92	11.20	95	11.22	105	11.22½	90	11.23	97	11.24	108	11.24½	88	11.25	95	11.27	107	11.27½	90	11.28	90	11.29
50	16 B	45	71	8.54	69	8.56	80	8.56½	107	8.57	102	8.58	72	8.58½	99	8.59	92	9.01	63	9.01½	70	9.02	...	...
36	16 A	73	93	9.46	95	9.48	96	9.49	82	9.50	57	9.51	78	9.53	53	9.54	46	9.55	62	9.56	48	9.57	55	9.58
37	16 B (w.)	48	84	3.07	53	3.07½	76	3.08	66	3.11	63	3.11½	39	3.12	20	3.12½	54	3.14½	61	3.15	45	3.17	54	3.17½
77	16 B (w.)	49	110	2.56	109	2.56½	102	2.57	118	2.59	106	2.59½	90	3.00	88	3.03	102	3.03½	94	3.04	97	3.06	74	3.07
181	16 B (w.)	49	148	11.34	134	11.34½	135	11.35	105	11.36	85	11.36½	90	11.37	111	11.40	80	11.40½	99	11.41	121	11.42	69	11.42½
38	17 (w.)	60	62	9.59	53	10.00	54	10.01	59	10.02	90	10.04	46	10.05	74	10.06	87	10.07	44	10.07½	69	10.09	85	10.10
39	18	74	76	3.40	76	3.40½	99	3.41	70	3.43	80	3.43½	91	3.44	81	3.45	77	3.46	89	3.46½	56	3.48	107	3.49
46	18	78	103	10.49	87	10.49½	83	10.50	97	10.53	106	10.53½	79	10.54	81	10.57	96	10.57½	86	10.58	83	11.01	98	11.01½
45	19	79	73	3.32½	93	3.34	100	3.34½	70	3.35	70	3.38	97	3.38½	75	3.39	73	3.41	94	3.41½	74	3.42	74	3.44
62	19	83	90	10.21½	70	10.22½	115	10.23	113	10.23½	101	10.24	66	10.25	105	10.25½	98	10.26	105	10.26½	67	10.28	102	10.28½
41	19	83	99	3.53	89	3.53½	45	3.54	71	3.56	86	3.56½	89	3.57	83	3.59	90	4.00	87	4.01	76	4.03	91	4.04
43	20 A (w.)	84	102	3.54	99	3.54½	70	3.55	115	3.57	100	3.57½	106	3.58	109	4.02	102	4.02½	100	4.03	113	4.05	96	4.05½
63	20 A (w.)	84	92	3.58	87	3.58½	67	3.59	94	4.00	92	4.01	82	4.02	74	4.03	100	4.03½	84	4.04	84	4.04½	60	4.08
90	20 A	80	70	10.51	118	10.51½	95	10.52	68	10.53	128	10.53½	94	10.54	62	10.56	122	10.56½	93	10.57	57	10.59	109	10.59½
177	20 A	80	44	11.29	56	11.29½	23	11.30	61	11.31	42	11.31½	27	11.36	64	11.36½	30	11.38	...	...	...	...	...	...
71	20 A (w.)	87	102	11.24	92	11.25	84	11.26	99	11.27	108	11.28	88	11.31	92	11.31½	106	11.32	83	11.32½	86	11.33	36	11.34
42	20 A (w.)	87	91	11.04	98	11.04½	78	11.05	98	11.07	59	11.07½	69	11.08	89	11.11	81	(b)	73	...	95	...	93	...
44	21	82	92	11.27	91	11.27½	81	11.28	77	11.30	91	11.30½	62	11.31	77	11.33	88	11.33½	68	11.34	68	11.36	78	11.36½
72	21 (w.)	91	91	10.57½	104	10.58	89	10.58½	81	11.00	90	11.00½	101	11.01	105	11.02	89	11.04	85	11.04½	96	11.05	83	11.08
88	21 (w.)	91	115	4.03	89	4.05	58	4.05½	107	4.06	32	4.06½	75	4.08	102	4.08½	39	4.09	65	4.11	53	4.11½	81	4.12

[a] Plus 5 per cent pitch.

[b] Blast off at 11.11 a. m.; belt on fan broke while pouring sixteenth ladle.

Cupola tests of coke from coals received in 1905—Continued.

Cupola test No.	Designation of coke. Field No. of coal.	Designation of coke. Coke test No.	Record of melt—Continued. Weight and time of each ladle of melted iron—Continued. 21. Lbs.	21. At—	22. Lbs.	22. At—	23. Lbs.	23. At—	24. Lbs.	24. At—	25. Lbs.	25. At—	26. Lbs.	26. At—	Melting time (minutes).	Remarks.
1	2	3	88	89	90	91	92	93	94	95	96	97	98	99	100	101
19	Connellsville coke														27	Iron hot.
	Illinois:															
54	11 D (w.)	5	89	11.55½	72	11.56									30	Do.
21	13 (w.)	2													34½	Iron very hot and fluid, but chilled at bottom; bed burned out.
93	13	3													25	Temperature of iron medium.
94	16	10													28	Iron cold.
	Indiana:															
82	4 (w.)	9													30	Temperature of iron medium.
83	5	8													28	Temperature of iron medium; blast off 1 minute.
187	5	8	90	11.32½	44	11.43									45	Temperature of iron medium.
48	7 A (w.)	13	62	10.56½	79	10.57	49	10.58	54	11.01	46	11.02			37	Iron cold.
175	7 A (w.)	13	91	11.15	79	11.17	101	11.17½	91	11.18	65	11.20	93	11.21	29	Temperature of iron medium.
173	9	17													23	Iron cold.
174	9	17	46	4.31											35	Temperature of first 7 ladles medium; balance hot.
81	9 B (w.)	18													29	Iron hot.
185	9 B (w.)	18	30	11.32											32	Temperature of iron medium.
22	11	51													54	Iron very hot and fluid; coke recommended for further trial.
184	11	51	69	4.22	90	4.22½	130	4.23	71	4.24	88	4.25			30	Iron hot.
	Kentucky:															
29	1 C	71	42	10.16	96	10.17	60	10.18	41	10.20	23	10.21	33	10.23	50	Do.
26	1 B	76	71	2.57	31	2.58									27	Iron very hot.
27	5	75	52	9.52	45	9.57									38	Iron hot and fluid.
28	6	90													32	Iron hot.
89	6	90	81	11.20											29	
67	6	86	45	10.26	86	10.27	95	10.28							32	Iron hot and fluid.
47	7	85	83	3.58½	97	3.59	47	4.01	77	4.01½	106	4.02	41	4.03	32	Iron hot; all pig iron used to determine effect of sulphur; 27th ladle—80 pounds at 4.03½; 28th ladle—67 pounds at 4.04; 29th ladle—35 pounds at 4.06.
55	7	85	75	5.05											26	Iron hot and fluid.
	Maryland:															
75	1 (w.) [a]	58													31	Iron hot.
	Ohio:															
23	5	22	113	2.34	87	2.34½	31	2.36							39	Iron very hot and fluid.
80	6 A, 6 B (w.)	66													24	Iron hot.
57	7 (w.)	94	100	4.32	83	4.32½	86	4.33	99	4.37	89	4.37½	91	4.38	36	Iron very hot and fluid; 27th ladle—76 pounds at 4.39; 28th ladle—65 pounds at 4.41.

70	7	89													33	Iron very hot and fluid.
56	8 A (w.)	93	42	12.02	35	12.04	36	12.04½	36	12.05					40	Iron hot and fluid; blast off 9 minutes on account of hard iron notch.
165	9	72													32	Temperature of iron medium.
166	9	72	79	11.57	104	11.59	80	11.59½	69	12.00	90	12.01			32	
	Pennsylvania:															
68	5 B (w.)	26	80	3.01	102	3.02	97	3.02½	87	3.05	53	3.05½	73	3.07	30	Iron hot.
180	5 B (w.)	26													33	Iron cold.
60	6	32													30	Iron cold; coke in bed very hard to ignite; bed burned very slowly.
85	6	41														Bottom dropped at 1.40 p. m.; blast on 30 minutes; no iron melted.
87	6	41													29	Iron cold.
84	6 A, 6 B (w.)	34													33	Iron hot; blast off 1 minute.
176	6 A, 6 B (w.)	34	101	3.54	101	3.54½	77	3.55	96	3.58	92	3.59			26	Iron very hot.
25	6 A, 6 B (w.)	38													40	Iron hot; charges hung in cupola and bottom had to be dropped; blast off 2 minutes.
61	6 A, 6 B (w.)	38	102	3.31	41	3.31½	88	3.34	95	3.35	40	3.36			32	Iron hot.
66	7 A, 7 B (w.)	33	41	10.22	80	10.25	43	10.26	110	10.26½	58	10.27			28	Temperature of iron medium.
79	7 A, 7 B	30													29	Iron hot.
65	8	29	50	12.05	79	12.08	95	12.08½	48	12.10½	26	12.11			29	Do.
188	8	29	66	4.01	87	4.02	87	4.02½	88	4.04	92	4.04½	89	4.06	26	Iron hot; 27th ladle—79 pounds at 4.07; 28th ladle—58 pounds at 4.08.
64	9 (w.) [b]	56													32	Iron cold.
76	9 (w.)	42													30	Iron hot.
189	9 (w.)	42	48	4.22	84	4.22½	70	4.23							35	Temperature of iron medium.
30	10	47	55	10.08	55	10.12	60	10.14							39	Iron hot and fluid; blast off 6 minutes.
73	10	53													27	Iron hot.
	Virginia:															
24	1 A	64														Iron hot after third ladle.
78	1 A	65														Temperature of iron medium.
31	1 B	77	81	4.11	92	4.12	94	4.12½	74	4.13	57	4.14				Iron very hot and fluid; blast off 4 minutes.
69	1 A	67													29	Temperature of iron medium.
186	1 A	67	61	4.28½	123	4.31	27	4.32							33	Iron hot.
59	1 A	68	72	3.37	33	3.37½	77	3.40	60	3.41					31	Temperature of iron medium.
183	1 A	68	68	11.40½	82	11.41	65	11.42	59	11.43					33	Iron hot.
158	2	69	83	11.32	46	11.36	83	11.36½	26	11.37					31	Do.
171	2 (w.)	70	101	11.17½	104	11.18	52	11.20	51	11.22					25	Do.
172	2 (w.)	70	95	4.17½	121	4.18	104	4.20	99	4.20½	116	4.21	67	4.22	27	Do.
92	2 B	63													33	Temperature of iron medium.
178	2 B	63	33	4.28											29	Iron hot.
52	2 B	69	74	8.22	95	8.22½	104	8.23	92	8.24					30	Iron hot; all pig iron used to determine effect of sulphur.
32	2 B (w.)	70	14	10.56½	149	11.01									32	Iron very hot and fluid.
33	3	61	27	4.42	37	4.44	65	4.45							29	Iron hot and fluid; melting too fast to handle; blast off 4 minutes.
91	3	61	99	4.06	121	4.08									31	Iron hot.
58	3	88	48	10.05½	103	11.06	64	11.09½	28	11.10					24	Iron hot; blast off 5 minutes.
40	3	88	98	11.54	60	11.58	77	11.59½	44	12.00					37	Temperature of iron medium.
34	4	62	101	9.30½	74	9.31	78	9.35	97	9.36	66	9.37			36	Iron very hot and fluid.

[a] Plus 10 per cent pitch.

[b] Plus 5 per cent pitch.

Cupola tests of coke from coals received in 1905—Continued.

Cupola test No.	Designation of coke.		Record of melt—Continued. Weight and time of each ladle of melted iron—Continued.												Melting time (minutes).	Remarks.
	Field No. of coal.	Coke test No.	21.		22.		23.		24.		25.		26.			
			Lbs.	At—	Lbs.	At—	Lbs.	At—	Lbs.	At—	Lbs.	At—	Lbs.	At—		
1	2	3	88	89	90	91	92	93	94	95	96	97	98	99	100	101
	West Virginia:															
159	4 (w.)	44													33	Temperature of iron medium.
160	4	44	119	11.30½	97	11.31	65	11.32							31	Iron hot.
35	4 B	40	101	3.04½	83	3.05	43	3.05½	100	3.12					34	Iron very hot and fluid.
53	4 B (w.)	44	91	10.28	92	10.32	35	10.34							25	Iron hot; all pig iron used to determine effect of sulphur.
74	4 B (w.)	46	72	8.57	61	8.59	157	8.59½	47	9.00					33	Iron hot.
86	4 B (w.)	46													28	Temperature of iron medium.
20	13 and 14	23	78	3.03	107	3.04	72	3.07	64	3.10	92	3.12	64	3.13	36	Iron very hot and fluid.
51	15	36	71	2.04½	85	2.07	102	2.07½	85	2.08	79	2.10	69	2.12	29	Iron hot; all pig iron used to determine effect of sulphur.
49	15	43	30	4.26											42	Do.
167	15	36													31	
168	15	36	96	11.39	102	11.39½	83	11.40	97	11.42	100	11.43			32	Iron hot.
182	15	43	148	4.42½	140	4.43									23	Temperature of iron medium.
169	16	45													40	Iron very cold.
170	16	45	102	11.29½	92	11.30	83	11.34	100	11.34½	88	11.35	45	11.36	29	Iron hot.
50	16 B	45													25	Temperature of iron medium; all pig iron used to determine effect of sulphur.
36	16 A	73	63	9.59	52	10.00	118	10.02	89	10.03					33	Iron hot; blast off 4 minutes.
37	16 B (w.)	48	44	3.19	43	3.20	82	3.21	42	3.21½	49	3.22	31	3.23	46	Iron fairly hot but sluggish.
77	16 B (w.)	49													29	Iron hot.
181	16 B (w.)	49	77	11.44	49	11.45									30	Do.
38	17 (w.)	60	42	10.11	62	10.13	70	10.14	54	10.15	43	10.16			38	Iron hot but sluggish.
39	18	74	77	3.49½	91	3.51	77	3.52	118	3.53	27	3.54	68	3.56	34	Iron very hot and fluid.
46	18	78	67	11.02	87	11.04	92	11.04½	66	11.05	70	11.08	78	11.09	37	Iron hot.
45	19	79	97	3.44½	69	3.45	73	3.46	100	3.47	72	3.48	75	3.50	36	Do.
62	19	83	104	10.29	55	10.29½	52	10.32	92	10.32½	82	10.33			24	Iron hot and fluid.
41	19	83	84	4.04½	76	4.05	45	4.07							33	Iron hot.
43	20 A (w.)	84	52	4.06	110	4.10	98	4.10½	68	4.11					34	Do.
63	20 A (w.)	84	82	4.08½	90	4.09	86	4.10							30	Iron hot and fluid.
90	20 A	80	94	11.00	52	11.03	88	11.04							30	Iron hot.
177	20 A	80													33	Iron cold.
71	20 A (w.)	87	78	11.37	66	11.38									34	Iron hot and fluid.
42	20 A (w.)	87	83												27	Temperature of iron medium.
44	21	82	50	11.37	54	11.38									29	Do.
72	21 (w.)	91	107	11.09											29	Iron hot.
88	21 (w.)	91	70	4.16½	69	4.17	120	4.18							31	Do.

Cupola tests of coke from coals received from January 1, 1906, to June 30, 1907.

Cupola test No.	Designation of coke.		Date.	Charges (pounds).																		Ratio of iron to coke.
	Field No. of coal.[a]	Coke test No.		Coke bed.	Pig iron.	Scrap.	Coke.	Pig iron.	Scrap.	Coke.	Pig iron.	Scrap.	Coke.	Pig iron.	Scrap.	Coke.	Pig iron.	Scrap.	Total.			
																			Coke.	Pig iron.	Scrap.	
1	2	3	4	5	6	7	8	9	10	11	12	13	14	15	16	17	18	19	20	21	22	23
	Alabama:																					
107	2 B (w.)	142	Aug. 1	200	600	200	58	413	138	58	413	138	57	412	137	57	412	137	430	2,250	750	7
131	2 B (w.)	142	Aug. 25	200	600	200	58	413	138	58	413	138	57	412	137	57	412	137	430	2,250	750	7
132	3	138	...do...	210	630	210	55	405	135	55	405	135	55	405	135	55	405	135	430	2,250	750	7
101	3 (w.)	139	Sept. 7	210	630	210	55	405	135	55	405	135	55	405	135	55	405	135	430	2,250	750	7
108	3 (w.)	139	Aug. 2	210	630	210	55	405	135	55	405	135	55	405	135	55	405	135	430	2,250	750	7
103	4	131	Sept. 8	200	600	200	58	413	138	58	413	138	57	412	137	57	412	137	430	2,250	750	7
124	4	131	Aug. 21	220	660	220	53	398	133	53	398	133	52	397	132	52	397	132	430	2,250	750	7
109	4 (w.)	136	Aug. 3	190	570	190	60	420	140	60	420	140	60	420	140	60	420	140	430	2,250	750	7
133	4 (w.)	136	Aug. 27	200	600	200	58	413	138	58	413	138	57	412	137	57	412	137	230	2,250	750	7
	Arkansas:																					
96	1 B (w.)[b]	97	Sept. 4	190	570	190	60	420	140	60	420	140	60	420	140	60	420	140	430	2,250	750	7
115	1 B (w.)[b]	97	Aug. 9	190	570	190	60	420	140	60	420	140	60	420	140	60	420	140	430	2,250	750	7
116	7 B (w.)[c]	105	Aug. 10	220	660	220	53	398	133	53	398	133	52	397	132	52	397	132	430	2,250	750	7
142	7 B (w.)[c]	105	Sept. 1	220	660	220	53	398	133	53	398	133	52	397	132	52	397	132	430	2,250	750	7
95	9 (w.)[b]	102	Sept. 4	210	630	210	55	405	135	55	405	135	55	405	135	55	405	135	430	2,250	750	7
117	9 (w.)[b]	102	Aug. 11	220	660	220	53	398	133	53	398	133	52	397	132	52	397	132	430	2,250	750	7
	Illinois:																					
125	22 B (w.)	118	Aug. 21	210	630	210	55	405	135	55	405	135	55	405	135	55	405	135	430	2,250	750	7
150	29 (w.)	170	Nov. 13	190	760	......	60	560	......	60	560	......	60	560	......	60	560	......	430	3,000	(d)	7
157	29 (w.)	170	Nov. 16	190	760	......	78	560	......	78	560	......	77	560	......	77	560	......	500	3,000	(d)	6
164	29 (w.)	170	Nov. 22	200	800	......	44	550	......	44	550	......	44	550	......	43	550	......	375	3,000	(e)	8
	Indiana:																					
121	12 (w.)	110	Aug. 17	180	540	180	63	428	143	63	428	143	62	427	142	62	427	142	430	2,250	750	7
148	17 (w.)	163	Nov. 12	190	760	......	60	560	......	60	560	......	60	560	......	60	560	......	430	3,000	(d)	7
	Kansas:																					
122	6 (w.)	115	Aug. 23	180	540	180	63	428	143	63	428	143	62	427	142	62	427	142	430	2,250	750	7
	Kentucky:																					
147	8	164	Nov. 10	200	800	......	58	550	......	58	550	......	57	550	......	57	550	......	430	3,000	(d)	7
155	8	164	Nov. 15	210	840	......	73	540	......	73	540	......	72	540	......	72	540	......	500	3,000	(d)	6
156	8	164	Nov. 16	200	800	......	44	550	......	44	550	......	44	550	......	43	550	......	375	3,000	(d)	8
149	9 A (w.)	167	Nov. 12	170	680	......	65	580	......	65	580	......	65	580	......	65	580	......	430	3,000	(d)	7
162	9 A (w.)	167	Nov. 21	170	680	......	52	580	......	51	580	......	51	580	......	51	580	......	375	3,000	(e)	8
163	9 A (w.)	167	...do...	190	760	......	78	560	......	78	560	......	77	560	......	77	560	......	500	3,000	(e)	6

[a] Details of origin of coal samples can be found in Bull. U. S. Geol. Survey No. 332.
[b] Plus 10 per cent pitch.
[c] Plus 5 per cent pitch.
[d] Pig iron used from car 27633.
[e] Pig iron used from car 131943.

Cupola tests of coke from coals received from January 1, 1906, to June 30, 1907—Continued.

Cupola test No.	Designation of coke. Field No. of coal.	Designation of coke. Coke test No.	Date.	Charges (pounds). Coke bed.	Pig iron.	Scrap.	Coke.	Pig iron.	Scrap.	Coke.	Pig iron.	Scrap.	Coke.	Pig iron.	Scrap.	Coke.	Pig iron.	Scrap.	Total. Coke.	Total. Pig iron.	Total. Scrap.	Ratio of iron to coke.
1	2	3	4	5	6	7	8	9	10	11	12	13	14	15	16	17	18	19	20	21	22	23
	Missouri:																					
123	5 (w.)	116	Aug. 20	190	570	190	60	420	140	60	420	140	60	420	140	60	420	140	430	2,250	750	7
	New Mexico:																					
119	4 B (w.)	151	Aug. 15	200	600	200	58	413	138	58	413	138	57	412	137	57	412	137	430	2,250	750	7
120	5 (w.)	147	...do...	220	660	220	53	398	133	53	398	133	52	397	132	52	397	132	430	2,250	750	7
98	3; 4 B (w.); 5	152	July 27	210	630	210	55	405	135	55	405	135	55	405	135	55	405	135	430	2,250	750	7
130			Aug. 24	200	600	200	58	413	138	58	413	138	57	412	137	57	412	137	430	2,250	750	7
	Pennsylvania:																					
143	11	159	Nov. 8	200	800	......	58	550	......	58	550	......	57	550	......	57	550	......	430	3,000	(a)	7
161	11	159	Nov. 20	220	880	......	70	530	......	70	530	......	70	530	......	70	530	......	500	3,000	(b)	6
145	12	161	Nov. 9	210	840	......	55	540	......	55	540	......	55	540	......	55	540	......	430	3,000	(a)	7
146	12 (w.)	162	Nov. 10	210	840	......	55	540	......	55	540	......	55	540	......	55	540	......	430	3,000	(a)	7
151	12	161	Nov. 13	220	880	......	70	530	......	70	530	......	70	530	......	70	530	......	500	3,000	(a)	6
152	12	161	Nov. 14	200	800	......	44	550	......	44	550	......	44	550	......	43	550	......	375	3,000	(a)	8
153	12 (w.)	162	...do...	210	840	......	73	540	......	73	540	......	72	540	......	72	540	......	500	3,000	(a)	6
154	12 (w.)	162	Nov. 15	220	880	......	38¾	530	......	38¾	530	......	38¾	530	......	38¾	530	......	375	3,000	(a)	8
190	21	187	Feb. 13[c]	210	630	210	55	405	135	55	405	135	55	405	135	55	405	135	430	2,250	750	7
	Tennessee:																					
126	1	133	Aug. 22	190	570	190	60	420	140	60	420	140	60	420	140	60	420	140	430	2,250	750	7
99	1 (w.)	153	July 30	200	600	200	57	412	137	57	412	137	58	413	138	58	413	138	430	2,250	750	7
128	1 (w.)	153	Aug. 23	200	600	200	58	413	138	58	413	138	57	412	137	57	412	137	430	2,250	750	7
100	2	127	July 30	190	570	190	60	420	140	60	420	140	60	420	140	60	420	140	430	2,250	750	7
140	2	127	Aug. 31	190	570	190	60	420	140	60	420	140	60	420	140	60	420	140	430	2,250	750	7
104	3	128	July 31	190	570	190	60	420	140	60	420	140	60	420	140	60	420	140	430	2,250	750	7
139	3	128	Aug. 31	190	570	190	60	420	140	60	420	140	60	420	140	60	420	140	430	2,250	750	7
102	4	125	Sept. 7	190	570	190	60	420	140	60	420	140	60	420	140	60	420	140	430	2,250	750	7
105	4	129	July 31	190	570	190	60	420	140	60	420	140	60	420	140	60	420	140	430	2,250	750	7
138	4	129	Aug. 30	190	570	190	60	420	140	60	420	140	60	420	140	60	420	140	430	2,250	750	7
106	5 (w.)	154	Aug. 1	190	570	190	60	420	140	60	420	140	60	420	140	60	420	140	430	2,250	750	7
129	5 (w.)	154	Aug. 24	190	570	190	60	420	140	60	420	140	60	420	140	60	420	140	430	2,250	750	7
112	6	122	Aug. 6	230	690	230	50	390	130	50	390	130	50	390	130	50	390	130	430	2,250	750	7
141	6	122	Sept. 1	220	660	220	53	398	133	53	398	133	52	397	132	52	397	132	430	2,250	750	7
113	7 B (w.)	123	Aug. 6	190	570	190	60	420	140	60	420	140	60	420	140	60	420	140	430	2,250	750	7
137	7 B (w.)	123	Aug. 29	190	570	190	60	420	140	60	420	140	60	420	140	60	420	140	430	2,250	750	7
114	8 B (w.)	134	Aug. 7	190	570	190	60	420	140	60	420	140	60	420	140	60	420	140	430	2,250	750	7
135	8 B (w.)	134	Aug. 28	180	540	180	63	428	143	63	428	143	62	427	142	62	427	142	430	2,250	750	7
110	9 (w.)	124	Aug. 3	190	570	190	60	420	140	60	420	140	60	420	140	60	420	140	430	2,250	750	7
136	9 (w.)	124	Aug. 28	200	600	200	58	413	138	58	413	138	57	412	137	57	412	137	430	2,250	750	7

111	10 (w.)	156	Aug. 4	230	690	230	50	390	130	50	390	130	50	390	130	50	390	130	430	2,250	750	7
127	10 (w.)	156	Aug. 27	250																		
144	11 (w.)	160	Nov. 9	240	960		48	510		48	510		47	510		47	510		430	3,000		7
179	11 (w.)	160	Dec. 3	220	660	220	53	398	133	53	398	133	52	397	132	52	397	132	430	2,250	750	7
	Utah:																					
118	1	130	Aug. 14	200	600	200	58	413	138	58	413	138	57	412	137	57	412	137	430	2,250	750	7
	Washington:																					
97	2	135	July 26	190	570	190	60	420	140	60	420	140	60	420	140	60	420	140	430	2,250	750	7
134	2	135	Aug. 27	200	600	200	58	413	138	58	413	138	57	412	137	57	412	137	430	2,250	750	7

a Pig iron used from car 27633.

b Pig iron used from car 131943.

c 1907.

Cupola tests of coke from coals received from January 1, 1906, to June 30, 1907—Continued.

	Designation of coke.		Analysis of coke (per cent).[a]										Record of melt.							
							Sulphur.						Pounds of iron.				Recovered (pounds).			
Cupola test No.	Field No. of coal.	Coke test No.	Moisture.	Volatile matter.	Fixed carbon.	Ash.	In coke.	In ash.	Phosphorus.	Specific gravity.	Fluidity strip, (per cent), full.	Maximum blast pressure (ounces).	Poured.	Additional melted.	Total.	Melting rate per hour (pounds).	Iron.	Coke.	Melting loss (per cent).	Melting ratio, iron to coke.
1	2	3	24	25	26	27	28	29	30	31	32	33	34	35	36	37	39	40	41	42
	Alabama:																			
107	2 B (w.)	142	3.04	1.06	82.15	13.75	1.16	....	.0700	1.88	99.9	7	2,257	322	2,579	4,991	214	37	6.9	6.56
131	2 B (w.)	142	3.04	1.06	82.15	13.75	1.16	....	.0700	1.88	99.9	7	1,852	365	2,217	4,587	413	48	12.33	5.80
132	3	138	2.03	1.80	74.89	21.28	.60	....	.0057	1.91	97.22	7	740	214	954	2,201	1,911	132	4.46	3.21
101	3 (w.)	139	.99	1.06	83.51	14.44	.58	....	.0008	1.99	99.9	7	1,695	305	2,000	3,429	807	75	6.43	5.63
108	3 (w.)	139	.99	1.06	83.51	14.44	.58	....	.0008	1.99	94.44	7	1,822	213	2,035	3,700	774	99	6.36	6.15
103	4	131	.29	.84	83.21	15.66	1.08	....	.0126	1.95	98.61	7	1,451	217	1,668	3,033	1,185	126	4.90	5.49
124	4	131	.29	.84	83.21	15.66	1.08	....	.0126	1.95	80.55	7	1,368	542	1,910	4,244	770	99	10.66	5.76
109	4 (w.)	136	.35	.42	92.99	6.24	.87	....	.008	1.95	99.9	7	2,328	153	2,481	5,513	334	72	6.16	6.93
133	4 (w.)	136	.35	.42	92.99	6.24	.87	....	.008	1.95	98.61	7	1,952	178	2,130	4,260	697	124	5.76	6.96
	Arkansas:																			
96	1 B (w.)[b]	97	2.74	1.29	85.81	10.16	1.02	.05	.0135	1.96	93.06	7	1,663	319	1,982	3,303	730	58	9.60	5.33
115	1 B (w.)[b]	97	2.74	1.29	85.81	10.16	1.02	.05	.0135	1.96	94.44	7	1,648	404	2,052	4,925	627	62	10.70	5.58
116	7 B (w.)[c]	105	.67	.85	89.14	9.34	1.60	.07	.0082	1.97	99.9	7	772	318	1,090	1,982	1,816	95	3.13	3.25
142	7 B (w.)[c]	105	.67	.85	89.14	9.34	1.60	.07	.0082	1.97	93.05	7	1,637	399	2,036	3,490	736	74	7.60	5.72
95	9 (w.)[b]	102	.30	.81	81.48	17.41	1.07	.17	.0329	2.04	88.89	7	679	354	1,033	2,214	1,815	140	5.07	3.56
117	9 (w.)[b]	102	.30	.81	81.48	17.41	1.07	.17	.0329	2.04	98.61	6½	1,005	288	1,293	3,103	1,464	108	8.10	4.01
	Illinois:																			
125	22 B (w.)	118	.65	1.60	80.76	16.99	3.65	.05	....	1.84	98.61	7	1,191	325	1,516	2,675	1,280	43	6.80	3.92
150	29 (w.)	170	2.78	.74	83.35	13.13	2.49	....	....	1.83	94.44	7	2,095	325	2,424	4,278	410	34	5.53	6.12
157	29 (w.)	170	2.78	.74	83.35	13.13	2.49	....	....	1.83	97.22	7	2,195	466	2,661	5,150	178	58	5.37	6.02
164	29 (w.)	170	2.78	.74	83.35	13.13	2.49	....	....	1.83	94.44	7	1,331	295	1,626	3,252	1,171	40	6.77	4.85
	Indiana:																			
121	12 (w.)	110	.42	1.03	84.37	14.18	2.89	.06	....	1.87	96.53	7	1,752	199	1,951	4,682	852	74	6.57	5.48
148	17 (w.)	163	1.65	.67	81.42	16.26	3.39	....	....	1.92	94.44	7	1,548	274	1,822	3,416	1,043	52	4.50	4.82
	Kansas:																			
122	6 (w.)	115	.59	.56	82.78	16.07	2.49	.02	....	1.90	97.22	7	1,468	230	1,698	3,087	1,098	132	6.80	5.70
	Kentucky:																			
147	8	164	.50	.65	87.96	10.89	.93	....	.0091	1.90	97.22	7	1,556	403	1,959	3,791	900	76	4.70	5.53
155	8	164	.50	.65	87.96	10.89	.93	....	.0091	1.90	93.05	7	2,101	361	2,462	3,887	360	79	5.93	5.85
156	8	164	.50	.65	87.96	10.89	.93	....	.0091	1.90	93.06	7	2,124	203	2,327	4,551	499	82	5.80	7.94
149	9 A (w.)	167	1.01	.69	86.46	11.84	1.96	....	....	1.86	95.83	7	2,282	228	2,510	5,378	250	53	8.00	6.66
162	9 A (w.)	167	1.01	.69	86.46	11.84	1.96	....	....	1.86	94.44	7	2,161	356	2,517	4,719	319	48	5.47	7.70
163	9 A (w.)	167	1.01	.69	86.46	11.84	1.96	....	....	1.86	98.61	7	2,230	123	2,353	3,361	558	29	2.97	5.00

	Missouri:																			
123	5 (w.)	116	1.12	.73	82.64	15.51	3.40	....	....	1.88	92.36	7	1,964	423	2,387	4,212	341	48	9.06	6.25
	New Mexico:																			
119	4 B (w.)	151	1.39	.85	83.66	14.10	.60	....	.0946	1.92	98.61	7	2,210	351	2,561	4,957	162	79	9.23	7.30
120	5 (w.)	147	.99	.84	81.38	16.79	.76	....	.0001	1.91	99.9	7	1,354	124	1,478	3,167	1,300	107	7.40	4.58
98	3. / 4 B (w.) / 5.	152	.69	1.48	82.18	15.65	.63	....	.0348	1.91	99.9	7	1,162	325	1,487	3,076	1,288	85	7.50	4.31
130			.69	1.48	82.18	15.65	.63	....	.0348	1.91	99.9	7	1,778	252	2,030	4,511	759	118	7.03	6.51
	Pennsylvania:																			
143	11	159	.52	.97	85.02	13.49	1.19	....	.0307	1.92	97.22	7	1,636	278	1,914	3,378	947	71	4.63	5.33
161	11	159	.52	.97	85.02	13.49	1.19	....	.0307	1.92	93.75	7	2,054	542	2,596	5,563	272	76	4.40	6.12
145	12	161	.69	.29	86.29	12.73	1.66	....	.0184	1.97	97.22	7	1,439	1,139	2,578	7,031	47	82	9.17	7.41
146	12 (w.)	162	.52	1.28	89.13	9.07	1.11	....	.0087	1.95	99.9	7	1,831	205	2,036	3,590	812	95	4.07	6.08
151	12	161	.69	.29	86.29	12.73	1.66	....	.0184	1.97	96.53	7	2,382	256	2,638	4,522	211	79	5.03	6.26
152	12	161	.69	.29	86.29	12.73	1.66	....	.0184	1.97	98.61	7	1,841	450	2,291	4,165	586	74	4.10	7.61
153	12 (w.)	162	.52	1.28	89.13	9.07	1.11	....	.0087	1.95	99.9	7	2,352	120	2,472	3,917	388	85	4.66	5.96
154	12 (w.)	162	.52	1.28	89.13	9.07	1.11	....	.0087	1.95	97.22	7	2,162	355	2,517	4,872	309	79	5.80	8.50
190	21	187	.63	.66	87.78	10.93	.82	....	.0115	1.90	....	7	1,793	691	2,484	5,962	211	90	10.16	7.31
	Tennessee:																			
126	1	133	.37	.73	83.00	15.90	1.35	....	.0238	1.96	97.22	7	1,240	244	1,484	2,698	1,342	112	5.80	4.67
99	1 (w.)	153	.93	.77	89.61	8.69	.93	....	.0253	1.87	92.00	7	1,443	563	2,006	3,540	646	106	11.60	6.19
128	1 (w.)	153	.93	.77	89.61	8.69	.93	....	.0253	1.87	99.9	7	1,833	210	2,043	3,605	769	119	6.26	6.57
100	2	127	1.13	.64	91.00	7.23	.78	....	.0094	1.81	99.9	7	1,551	556	2,107	3,830	699	66	6.46	5.79
140	2	127	1.13	.64	91.00	7.23	.78	....	.0094	1.81	94.44	7	2,080	270	2,350	4,147	477	36	5.77	5.97
104	3	128	.67	.81	87.44	11.08	.88	....	.0125	1.87	95.83	7½	1,477	429	1,906	3,267	856	84	7.93	5.51
139	3	128	.67	.81	87.44	11.08	.88	....	.0125	1.87	97.81	6½	1,913	239	2,152	4,035	650	50	6.60	5.55
102	4	125	.54	1.56	84.27	13.63	.72	.03	.0215	1.93	98.61	7	1,731	219	1,950	3,656	852	79	6.60	5.57
105	4	129	1.43	.28	86.73	11.56	.69	....	.0233	1.91	99.0	7½	1,915	131	2,046	3,960	753	78	6.70	5.81
138	4	129	1.43	.28	86.73	11.56	.69	....	.0233	1.91	94.44	7	1,875	252	2,127	3,191	688	81	6.16	6.09
106	5 (w.)	154	.56	.42	90.46	8.56	2.08	....	....	1.91	98.51	7	2,328	144	2,472	4,784	279	73	8.30	6.92
129	5 (w.)	154	.56	.42	90.46	8.56	2.08	....	....	1.91	93.05	7	1,825	418	2,243	3,958	573	74	6.13	6.30
112	6	122	.22	.91	79.01	19.86	.69	.03	.0834	1.95	....	7	....	....	....	....	....	....	....	....
141	6	122	.22	.91	79.01	19.86	.69	.03	.0834	1.95	99.9	7	749	296	1,045	2,090	1,808	197	4.90	4.48
113	7 B (w.)	123	.57	.87	83.59	14.97	1.77	.04	.0468	1.93	98.61	7	2,384	132	2,516	5,032	122	141	12.06	8.70
137	7 B (w.)	123	.57	.87	83.59	14.97	1.77	.04	.0468	1.93	95.83	6½	1,446	444	1,890	3,336	942	128	5.60	6.26
114	8 B (w.)	134	.32	.11	85.66	13.91	2.45	....	.0238	1.98	93.14	7	2,301	217	2,518	3,918	231	66	8.36	6.92
135	8 B (w.)	134	.32	.11	85.66	13.91	2.45	....	.0238	1.98	97.22	7	1,547	1,034	2,581	5,956	169	38	8.33	6.59
110	9 (w.)	124	.39	.39	85.78	13.44	.61	.04	.0968	1.93	99.9	6½	1,950	110	2,060	3,635	735	102	6.83	6.28
136	9 (w.)	124	.39	.39	85.78	13.44	.61	.04	.0968	1.93	93.05	7	2,106	250	2,356	5,437	615	85	1.13	6.83
111	10 (w.)	156	1.67	.81	77.81	19.71	.95	....	.0390	1.90	....	....	....	....	....	....	....	....	....	....
127	10 (w.)	156	1.67	.81	77.81	19.71	.95	....	.0390	1.90	....	....	....	....	....	....	....	....	....	....
144	11 (w.)	160	1.14	1.60	80.14	17.12	.69	....	....	1.97	....	....	....	....	....	....	....	....	....	....
179	11 (w.)	160	1.14	1.60	80.14	17.12	.69	....	....	1.97	86.11	6	424	317	741	2,223	2,189	143	2.03	2.58
	Utah:																			
118	1	130	2.53	1.37	88.06	8.04	.86	....	.0005	1.78	....	7	....	....	....	....	....	....	....	....
	Washington:																			
97	2	135	1.02	2.10	77.53	19.35	.44	....	.0847	1.90	91.60	7	903	299	1,202	2,487	1,529	33	8.96	3.03
134	2	135	1.02	2.10	77.53	19.35	.44	....	.0847	1.90	97.22	7	1,411	365	1,776	3,552	1,122	32	3.40	4.46

[a] For chemical analyses of coals from which these cokes were made, see pp. 27–35. [b] Plus 10 per cent pitch. [c] Plus 5 per cent pitch.

Cupola tests of coke from coals received from January 1, 1906, to June 30, 1907—Continued.

Cupola test No.	Designation of coke.		Record of melt—Continued.																				
					Weight and time of each ladle of melted iron.																		
	Field No. of coal.	Coke test No.	Blast on at—	Iron running.	1.		2.		3.		4.		5.		6.		7.		8.		9.	
					Lbs.	At—	Lbs.	At—	Lbs.	At—	Lbs.	At—	Lbs.	At—	Lbs.	At—	Lbs.	At—	Lbs.	At—	Lbs.	At—
1	2	3	46	47	48	49	50	51	52	53	54	55	56	57	58	59	60	61	62	63	64	65
	Alabama:																					
107	2 B (w.)	142	1.59 p. m.	2.04	69	2.11	69	2.11½	89	2.16	98	2.16½	82	2.19	101	2.19½	70	2.20	81	2.22	83	2.22½
131	2 B (w.)	142	10.42 a. m.	10.49	33	10.51	79	10.53	77	10.56	30	10.57	74	10.58½	73	10.59	68	11.03	72	11.04	76	11.04½
132	3	138	2.49 p. m.	3.01	92	3.10	100	3.10½	61	3.11	77	3.13	77	3.13½	70	3.16	34	3.16½	65	3.18	34	3.19
101	3 (w.)	139	11.17 a. m.	11.27	77	11.32	91	11.36	97	11.36½	72	11.43	72	11.43½	70	11.44	62	11.47	76	11.47½	73	11.48
108	3 (w.)	139	3.39 p. m.	3.44	103	3.55	119	3.55½	51	3.56	69	4.00	116	4.00½	102	4.01	110	4.01½	86	4.03½	1.07	4.04
103	4	131	8.19 a. m.	8.30	66	8.35	95	8.38	75	8.41	36	8.42	96	8.43	61	8.45	101	8.45½	70	8.51	88	8.51½
124	4	131	10.04 a. m.	10.14	91	10.19	34	10.19½	90	10.26	76	10.26½	83	10.27	69	10.30	72	10.31	92	10.32	57	10.33
109	4 (w.)	136	10.30 a. m.	10.37	54	10.41	112	10.45	125	10.45½	102	10.46	112	10.47	110	10.47½	69	10.48	108	10.51½	114	10.52
133	4 (w.)	136	10.53 a. m.	11.01	51	11.07	84	11.10	94	11.11	69	11.13	82	11.15	105	11.15½	80	11.16	72	11.18½	116	11.19
	Arkansas:																					
96	1 B (w.)[a]	97	3.50 p. m.	3.58	64	4.02	78	4.07	85	4.07½	65	4.12	73	4.12½	41	4.13	79	4.13½	70	4.14	70	4.19
115	1 B (w.)[a]	97	3.33 p. m.	3.47	106	3.57	107	3.57½	104	3.58	110	4.05	112	4.06	111	4.06½	129	4.07	107	4.07½	128	4.08
116	7 B (w.)[b]	105	10.41 a. m.	10.53	83	11.05	94	11.06	74	11.11	90	11.12	97	11.12½	23	11.13	65	11.17	72	11.17½	89	11.18
142	7 B (w.)[b]	105	10.55 a. m.	11.01	81	11.07	87	11.10	75	11.10½	73	11.12	70	11.12½	80	11.17	75	11.17½	80	11.18	84	11.19
95	9 (w.)[a]	102	10.50 a. m.	11.02	82	11.16	50	11.19	92	11.19½	53	11.20	58	11.26	72	11.26½	91	11.27	61	11.29	59	11.29½
117	9 (w.)[a]	102	8.02 a. m.	8.18	78	8.26	52	8.31	53	8.31½	70	8.32	67	8.32½	37	8.34	60	8.34½	66	8.35	83	8.35½
	Illinois:																					
125	22 B (w.)	118	3.04 p. m.	3.12	80	3.20	74	3.20½	96	3.23	81	3.24	94	3.26	62	3.26½	62	3.31	74	3.32	78	3.32½
150	29 (w.)	170	10.59 a. m.	11.11	55	11.14	96	11.18	110	11.19	69	11.23	103	11.23½	103	11.24	75	11.25	98	11.25½	103	11.26
157	29 (w.)	170	3.15 p. m.	3.25	19	3.28	95	3.32	107	3.32½	86	3.33	87	3.36	107	3.36½	85	3.37	81	3.40	100	3.40½
164	29 (w.)	170	11.10 a. m.	11.19	86	11.25	32	11.25½	93	11.28	88	11.28½	52	11.29	90	11.30	69	11.31	65	11.38	83	11.38½
	Indiana:																					
121	12 (w.)	110	10.42 a. m.	10.54	80	10.57	77	10.58	110	10.59	60	11.02	83	11.02½	58	11.03	106	11.05	95	11.05½	57	11.06
148	17 (w.)	163	11.17 a. m.	11.28	24	11.30	95	11.34	101	11.34½	79	11.39	94	11.39½	108	11.40	76	11.41	98	11.42	78	11.46
	Kansas:																					
122	6 (w.)	115	8.57 a. m.	9.04	133	9.16	111	9.16½	102	9.19½	83	9.20	100	9.22	98	9.22½	89	9.23	103	9.23½	80	9.24
	Kentucky:																					
147	8	164	3.30 p. m.	3.41	86	3.47	86	3.47½	40	3.48	72	3.52	91	3.52½	94	3.53	67	3.56	102	3.56½	98	3.57
155	8	164	3.40 p. m.	3.48	67	3.54	97	3.57	39	3.57½	81	4.00	113	4.01	85	4.03	87	4.03½	103	4.04	90	4.07
156	8	164	10.56 a. m.	11.07	32	11.10	94	11.13	82	11.13½	70	11.18	102	11.18½	100	11.19	70	11.22	101	11.22½	102	11.23
149	9 A (w.)	167	3.08 p. m.	3.17	90	3.23	50	3.23½	78	3.25	96	3.25½	69	3.26	88	3.28	102	3.28½	118	3.29	91	3.31
162	9 A (w.)	167	10.45 a. m.	10.55	84	11.00	96	11.03	105	11.03½	96	11.04	80	11.07	101	11.07½	89	11.08	82	11.09	97	11.09½
163	9 A (w.)	167	3.35 p. m.	3.45	66	3.49	114	3.51	110	3.54	103	3.55	30	3.55½	128	4.02	96	4.02½	97	4.03	100	4.07
	Missouri:																					
123	5 (w.)	116	3.16 p. m.	3.21	67	3.29	85	3.33	81	3.34	54	3.37	53	3.37½	92	3.38	62	3.39	66	3.40	69	3.41

	New Mexico:																					
119	4 B (w.)	151	8.57 a. m.	9.03	95	9.12	53	9.12½	96	9.16	94	9.16½	28	9.17	88	9.19	102	9.20	70	9.20½	89	9.21
120	5 (w.)	147	2.17 p. m.	2.27	93	2.34	50	2.34½	57	2.39	107	2.39½	99	2.40	43	2.40½	83	2.41	92	2.42	95	2.43
98	4 B (w.)	152	1.48 p. m.	1.59	83	2.07	86	2.07½	39	2.08	78	2.15	79	2.15½	86	2.16	58	2.18	66	2.18½	70	2.19
130	5	152	3.18 p. m.	3.28	94	3.34	52	3.34½	97	3.38	88	3.38½	79	3.39	109	3.39½	83	3.40½	82	3.41	91	3.42
	Pennsylvania:																					
143	11	159	3.08 p. m.	3.18	68	3.22	72	3.24	104	3.26	90	3.27	90	3.32	101	3.32½	87	3.33	93	3.35	99	3.35½
161	11	159	1.58 p. m.	2.08	93	2.12	110	2.13	80	2.16	82	2.16½	125	2.17	68	2.22	73	2.22½	59	2.23	109	2.23½
145	12	161	3.13 p. m.	3.24	106	3.32	112	3.32½	103	3.35	91	3.35½	100	3.36	97	3.37	89	3.38	87	3.38½	106	3.39
146	12 (w.)	162	11.14 a. m.	11.26	100	11.30	97	11.32	100	11.33	101	11.34	88	11.38	110	11.38½	69	11.39	151	11.42	111	11.42½
151	12	161	3.29 p. m.	3.40	55	3.43	98	3.46	55	3.46½	94	3.49	103	3.49½	96	3.50	90	3.53	101	3.53½	105	3.54
152	12	161	10.39 a. m.	10.47	97	10.53	96	10.59	110	10.59½	91	11.00	95	11.04	101	11.04½	112	11.05	118	11.05½	100	11.07
153	12 (w.)	162	2.56 p. m.	3.07	95	3.11	29	3.11½	97	3.14	95	3.14½	108	3.18	108	3.18½	108	3.19	102	3.23	108	3.23½
154	12 (w.)	162	10.57 a. m.	11.06	92	11.15	133	11.15½	78	11.16	122	11.16½	93	11.19	93	11.19½	93	11.20	135	11.22	95	11.22½
190	21	187	11.00 a. m.	11.06	61	11.10	132	11.13	80	11.15	62	11.17	147	11.17½	55	11.18	49	11.20	136	11.20½	73	11.21
	Tennessee:																					
126	1	133	9.58 a. m.	10.08	85	10.13	95	10.19	98	10.19½	82	10.20	82	10.22	81	10.22½	76	10.23	68	10.28	95	10.28½
99	1 (w.)	153	8.47 a. m.	8.54	66	9.05	59	9.06	68	9.09	61	9.10	62	9.11	51	9.12	51	9.13	61	9.14	43	9.15
128	1 (w.)	153	3.11 p. m.	3.16	65	3.29	110	3.29½	100	3.30	75	3.32	104	3.32½	117	3.33	41	3.35½	91	3.36	108	3.36½
100	2	127	1.20 p. m.	1.27	52	1.35	34	1.35½	64	1.40	70	1.40½	52	1.41	94	1.42	79	1.42½	73	1.43	80	1.45½
140	2	127	2.47 p. m.	2.53	28	2.59	110	3.01	44	3.01½	90	3.04	78	3.07	106	3.07½	102	3.08	80	3.10	101	3.10½
104	3	128	9.08 a. m.	9.16	50	9.21	64	9.21½	62	9.22	77	9.24	82	9.25	20	9.25½	57	9.31	68	9.31½	64	9.32
139	3	128	10.43 a. m.	10.52	93	10.56	93	10.59	100	10.59½	81	11.02	62	11.02½	89	11.06	81	11.06½	101	11.07	87	11.09
102	4	125	3.15 p. m.	3.23	104	3.32	62	3.32½	95	3.35	79	3.35½	86	3.38	22	3.38½	79	3.40	91	3.41½	76	3.42
105	4	129	2.25 p. m.	2.32	94	2.38	98	2.38½	48	2.39	89	2.42	111	2.43	113	2.43½	87	2.46	104	2.46½	97	2.47
138	4	129	3.51 p. m.	4.00	87	4.03	73	4.06	84	4.06½	46	4.07	89	4.09	79	4.11	106	4.11½	60	4.12	98	4.14
106	5 (w.)	154	9.13 a. m.	9.20	103	9.25	107	9.25½	80	9.26	86	9.29	109	9.30	116	9.31	89	9.32	108	9.32½	89	9.35
129	5 (w.)	154	9.44 a. m.	9.50	80	9.58	65	9.59	91	10.05	64	10.06	87	10.09	88	10.09½	64	10.10	76	10.11½	84	10.12
112	6	122																				
141	6	122	8.05 a. m.	8.10	36	8.18	78	8.23	88	8.24	78	8.28	69	8.28½	40	8.29	57	8.32	57	8.32½	45	8.33
113	7 B (w.)	123	3.30 p. m.	3.38	93	3.47	56	3.47½	102	3.51½	93	3.52	78	3.56	102	3.56½	83	3.57	71	3.59	106	3.59½
137	7 B (w.)	123	10.30 a. m.	10.39	88	10.48	96	10.48½	61	10.49	76	10.53	88	10.53½	93	10.54	67	10.55	70	10.55½	76	10.56½
114	8 B (w.)	134	11.05 a. m.	11.12	61	11.18	92	11.24	105	11.24½	64	11.25	74	11.27	98	11.27½	87	11.28	78	11.28½	61	11.30
135	8 B (w.)	134	9.47 a. m.	9.54	30	9.56	72	9.58	102	10.00	75	10.01	87	10.04	87	10.04½	84	10.06½	78	10.07	21	10.07½
110	9 (w.)	124	3.27 p. m.	3.33	46	3.37	86	3.42	103	3.42½	24	3.43	95	3.45½	100	3.46	101	3.47	94	3.49	103	3.49½
136	9 (w.)	124	3.41 p. m.	3.48	96	3.57	110	3.57½	43	3.58	77	3.59	103	4.00	111	4.00½	30	4.01	88	4.01½	101	4.03
111	10 (w.)	156	10.51 a. m.																			
127	10 (w.)	156																				
144	11 (w.)	160	10.50 a. m.																			
179	11 (w.)	160	11.28 a. m.	11.44	84	11.51	41	11.52	75	11.56	92	11.57	55	12.03	77	12.04						
	Utah:																					
118	1	130	10.41 a. m.																			
	Washington:																					
97	2	135	9.41 a. m.	9.50	24	9.53	36	9.56	83	10.00	91	10.04	96	10.04½	17	10.05	58	10.08	76	10.09	64	10.10
134	2	135	4.27 p. m.	4.34	78	4.43	30	4.43½	80	4.46	44	4.46½	78	4.48	41	4.48½	73	4.49	98	4.50	26	4.50½

a Plus 10 per cent pitch.

b Plus 5 per cent pitch.

Cupola tests of coke from coals received from January 1, 1906, to June 30, 1907—Continued.

Cupola test No.	Designation of coke.		Record of melt—Continued. Weight and time of each ladle of melted iron—Continued.																					
	Field No. of coal.	Coke test No.	10.		11.		12.		13.		14.		15.		16.		17.		18.		19.		20.	
			Lbs.	At—	Lbs.	At—	Lbs.	At—	Lbs.	At—	Lbs.	At—	Lbs.	At—	Lbs.	At—	Lbs.	At—	Lbs.	At—	Lbs.	At—	Lbs.	At—
1	2	3	66	67	68	69	70	71	72	73	74	75	76	77	78	79	80	81	82	83	84	85	86	87
	Alabama:																							
107	2 B (w.)	142	89	2.23	87	2.23½	95	2.24	82	2.25	99	2.25½	75	2.26	79	2.26½	81	2.27	89	2.28	69	2.29	85	2.30
131	2 B (w.)	142	46	11.05	71	11.07	60	11.07½	94	11.08	47	11.08½	90	11.11	62	11.11½	102	11.12	94	11.13	60	11.13½	86	11.14
132	3	138	64	3.23	2	3.23½	64	3.27	....	....	....	....	....	....	....	....	....	....	....	....	....	....	....	....
101	3 (w.)	139	91	11.49	74	11.49½	74	11.50	85	11.53	86	11.53½	67	11.54	78	11.56	95	11.56½	71	11.57	73	11.59	97	11.59½
108	3 (w.)	139	91	4.04½	106	4.05	79	4.07	101	4.07½	102	4.08	58	4.08½	61	4.12	85	4.12½	95	4.13	81	4.16	100	4.17
103	4	131	99	8.52	94	8.56	97	8.56½	90	8.57	104	8.59	96	8.59½	88	9.00	95	9.03	....	....	....	....	....	....
124	4	131	66	10.33½	90	10.34	64	10.34½	53	10.35	80	10.37	53	10.37½	99	10.38	66	10.38½	72	10.40	61	10.41	....	....
109	4 (w.)	136	92	10.52½	113	10.53	104	10.55	105	10.55½	108	10.56	100	10.56½	97	10.57	118	10.57½	110	10.58	80	10.59	110	11.02
133	4 (w.)	136	92	11.19½	83	11.20	107	11.22	102	11.22½	80	11.23	106	11.23½	68	11.24	101	11.26	104	11.27	77	11.27½	84	11.28
	Arkansas:																							
96	1 B (w.)[a]	97	75	4.19½	61	4.20	108	4.22	115	4.22½	61	4.23	97	4.24	112	4.24½	58	4.25	77	4.28	98	4.28½	55	4.29
115	1 B (w.)[a]	97	111	4.09	108	4.10	100	4.10½	126	4.11	95	4.11½	94	4.12	....	....	....	....	....	....	....	....	....	....
116	7 B (w.)[b]	105	61	11.25	24	11.26	....	....	....	....	....	....	....	....	....	....	....	....	....	....	....	....	....	....
142	7 B (w.)[b]	105	61	11.23	99	11.23½	83	11.24	64	11.25	104	11.25½	77	11.26	55	11.28	98	11.28½	72	11.29	58	11.33	63	11.33½
95	9 (w.)[a]	102	61	11.30	....	....	....	....	....	....	....	....	....	....	....	....	....	....	....	....	....	....	....	....
117	9 (w.)[a]	102	77	8.38	54	8.38½	55	8.39	64	8.39½	70	8.41½	48	8.42	45	8.42½	26	8.43	....	....	....	....	....	....
	Illinois:																							
125	22 B (w.)	118	79	3.33	60	3.38	68	3.38½	105	3.39	29	3.39½	92	3.44	24	3.45	33	3.46	....	....	....	....	....	....
150	29 (w.)	170	70	11.27	102	11.27½	103	11.28	66	11.30	99	11.30½	97	11.31	90	11.34	98	11.34½	100	11.35	97	11.40	94	11.40½
157	29 (w.)	170	80	3.41	101	3.43	101	3.43½	88	3.44	107	3.45	97	3.45½	98	3.46	106	3.48	102	3.48½	90	3.49	88	3.52
164	29 (w.)	170	82	11.39	60	11.43	83	11.43½	84	11.44	57	11.46	78	11.46½	136	11.47	53	11.48	40	11.49	....	....	....	....
	Indiana:																							
121	12 (w.)	110	99	11.08	95	11.08½	76	11.09	106	11.10	100	11.10½	32	11.11	102	11.13	96	11.13½	49	11.14	24	11.15	27	11.16
148	17 (w.)	163	68	11.46½	96	11.47	80	11.49	73	11.49½	96	11.50	65	11.54	68	11.54½	85	11.55	56	11.59	108	12.00	....	....
	Kansas:																							
122	6 (w.)	115	80	9.26	99	9.27	82	9.28	61	9.34	75	9.35	71	9.36	47	9.36½	54	9.37	....	....	....	....	....	....
	Kentucky:																							
147	8	164	88	4.03	84	4.03½	94	4.04	168	4.04½	86	4.08	90	4.08½	84	4.09	82	4.11	44	4.12	....	....	....	....
155	8	164	79	4.07½	108	4.08	84	4.11	75	4.11½	106	4.12	85	4.14	81	4.14½	105	4.15	76	4.17	76	4.17½	104	4.18
156	8	164	59	11.24	104	11.24½	92	11.27	77	11.27½	107	11.28	94	11.29	91	11.29½	93	11.30	89	11.32	102	11.32½	100	11.33
149	9 A (w.)	167	100	3.31½	115	3.32	79	3.33	98	3.33½	106	3.34	83	3.35	96	3.35½	110	3.36	83	3.37	104	3.37½	102	3.39
162	9 A (w.)	167	82	11.11	83	11.11½	93	11.12	88	11.14	84	11.14½	100	11.15	80	11.18	86	11.18½	96	11.19	126	11.23	69	11.23½
163	9 A (w.)	167	91	4.07½	126	4.08	100	4.11	100	4.11½	136	4.12	86	4.17	95	4.17½	130	4.18	90	4.24	148	4.24½	98	4.25
	Missouri:																							
123	5 (w.)	116	51	3.42	63	3.43	60	3.43½	79	3.44	91	3.45	62	3.45½	58	3.46	70	3.46	94	3.47	59	3.48	45	3.48½

	New Mexico:																							
119	4 B (w.)	151	66	9.23	86	9.23½	85	9.24	106	9.24½	83	9.25	76	9.26	103	9.26½	81	9.27	88	9.28	106	9.28½	86	9.29
120	5 (w.)	147	99	2.43½	96	2.44½	101	2.47	90	2.48	56	2.48½	92	2.52½	32	2.53	69	2.55						
98	3.		52	2.21	61	2.22	56	2.22½	55	2.24	64	2.24½	53	2.25	68	2.27	42	2.27½	66	2.28				
	4 B (w.)	152																						
130	5.		95	3.42½	75	3.43½	48	3.44	94	3.45	84	3.45½	82	3.46	24	3.47	86	3.49½	99	3.50	84	3.51	64	3.51½
	Pennsylvania:																							
143	11	159	87	3.36	86	3.38	102	3.38½	80	3.39	93	3.43	85	3.43½	93	3.44	78	3.48	100	3.49	28	3.52		
161	11	159	137	2.24	70	2.25	119	2.25½	73	2.26	64	2.28	86	2.28½	132	2.29	66	2.30	94	2.30½	134	2.31	61	2.33
145	12	161	59	3.52	50	3.52½	68	3.59	72	4.00	82	4.01	65	4.02	59	4.04	70	4.04½	23	4.05				
146	12 (w.)	162	112	11.43	103	11.48	163	11.48½	95	11.49	96	11.55	114	11.55½	89	11.56	60	11.58	72	12.00				
151	12	161	77	3.59	107	3.59½	145	4.00	106	4.00½	100	4.01	99	4.03	117	4.03½	83	4.04	76	4.08	107	4.08½	105	4.09
152	12	161	107	11.07½	106	11.08	89	11.10	104	11.10½	107	11.11	105	11.14	110	11.14½	111	11.15	57	11.19	25	11.20		
153	12 (w.)	162	112	3.24	99	3.25	100	3.25½	100	3.26	101	3.29	100	3.29½	115	3.30	90	3.32	99	3.34	109	3.34½	85	3.35
154	12 (w.)	162	109	11.23	101	11.25	73	11.25½	86	11.26	113	11.28	73	11.28½	93	11.29	118	11.31	73	11.31½	100	11.32	114	11.35
190	21	187	52	11.22	125	11.22½	83	11.23	52	11.25	72	11.25½	30	11.26	89	11.26½	132	11.28	64	11.28½	44	11.29	28	11.29½
	Tennessee:																							
126	1	133	74	10.29	108	10.34	71	10.34½	87	10.35	53	10.35½	85	10.41										
99	1 (w.)	153	58	9.16	52	9.16½	42	9.17	88	9.18	50	9.19	45	9.20	73	9.21	43	9.22	60	9.23	62	9.24	35	9.25
128	1 (w.)	153	72	3.38	98	3.39	108	3.40	87	3.40½	123	3.41	92	3.46	93	3.46½	92	3.47	103	3.49	85	3.50	69	3.51
100	2	127	67	1.46	60	1.46½	68	1.48	60	1.48½	51	1.49	61	1.50	53	1.50½	50	1.51	81	1.52	58	1.52½	46	1.53
140	2	127	82	3.11	83	3.13	78	3.13½	83	3.15	107	3.15½	61	3.16	80	3.18	111	3.18½	57	3.19	79	3.21	108	3.21½
104	3	128	61	9.36	50	9.36½	42	9.37	84	9.38	43	9.38½	36	9.40	101	9.40½	39	9.41	42	9.42	77	9.42½	41	9.43
139	3	128	117	11.09½	108	11.10	85	11.13	122	11.13½	101	11.14	76	11.17	115	11.17½	110	11.18	65	11.23	112	11.23½	115	11.24
102	4	125	107	3.45	107	3.45½	81	3.46	103	3.48	110	3.48½	55	3.49	103	3.50	84	3.51	74	3.54	108	3.54½	105	3.55
105	4	129	95	2.48	98	2.48½	89	2.50	88	2.51	91	2.51½	105	2.53	34	2.54	91	2.56	100	2.57½	86	2.58	70	3.00
138	4	129	31	4.14½	78	4.18	116	4.18½	93	4.19	71	4.23	92	4.23½	122	4.24	92	4.28	102	4.28½	77	4.29	103	4.32
106	5 (w.)	154	81	9.35½	100	9.36	87	9.38	111	9.38½	103	9.39	88	9.40	111	9.40½	111	9.41	98	9.42	101	9.42½	97	9.43
129	5 (w.)	154	102	10.12½	95	10.13	80	10.13½	80	10.14	104	10.14½	78	10.15½	115	10.16	108	10.16½	84	10.17	83	10.17½	32	10.18
112	6	122																						
141	6	122	55	8.36	51	8.36½	24	8.37	56	8.39	15	8.40												
113	7 B (w.)	123	97	4.00	87	4.01	110	4.01½	93	4.02	105	4.03	87	4.03½	94	4.04	105	4.05	88	4.05½	90	4.06	106	4.07
137	7 B (w.)	123	97	10.57	92	10.58	100	10.59½	46	11.01	63	11.02	35	11.03	86	11.06	61	11.07	67	11.12	84	11.13		
114	8 B (w.)	134	83	11.30½	101	11.31	109	11.31½	104	11.33	90	11.33½	95	11.34	64	11.34½	78	11.36	103	11.36½	96	11.37	77	11.37½
135	8 B (w.)	134	89	10.09	80	10.11½	85	10.12	65	10.12½	69	10.13½	73	10.14	74	10.15	82	10.17	107	10.17½	76	10.18	111	10.21
110	9 (w.)	124	55	3.50	96	3.53	104	3.53½	97	3.54	87	3.57½	100	3.58	105	3.59	88	4.01	98	4.02	93	4.02½	86	4.05½
136	9 (w.)	124	104	4.03½	72	4.04	93	4.06	107	4.06½	88	4.07	84	4.07½	100	4.09	93	4.09½	84	4.10	91	4.10½	109	4.11
111	10 (w.)	156																						
127	10 (w.)	156																						
144	11 (w.)	160																						
179	11 (w.)	160																						
	Utah:																							
118	1	130																						
	Washington:																							
97	2	135	59	10.10½	60	10.12	51	10.13	55	10.13½	94	10.15	30	10.18	9	10.19								
134	2	135	88	4.51½	84	4.53	73	4.55	68	4.55½	72	4.57	68	4.57½	107	4.58	79	4.59	21	5.00	56	5.01½	59	5.02

a Plus 10 per cent pitch.

b Plus 5 per cent pitch.

Cupola tests of coke from coals received from January 1, 1906, to June 30, 1907—Continued.

Cupola test No.	Designation of coke. Field No. of coal.	Designation of coke. Coke test No.	Record of melt—Continued. Weight and time of each ladle of melted iron—Continued. 21. Lbs.	21. At—	22. Lbs.	22. At—	23. Lbs.	23. At—	24. Lbs.	24. At—	25. Lbs.	25. At—	26. Lbs.	26. At—	Melting time (minutes).	Remarks.
1	2	3	88	89	90	91	92	93	94	95	96	97	98	99	100	101
	Alabama:															
107	2 B (w.)	142	102	2.30½	79	2.31	69	2.31½	83	2.33	103	2.33½	52	2.34	31	Iron very hot and fluid; 27th ladle—97 pounds at 2.35.
131	2 B (w.)	142	20	11.14½	86	11.15	53	11.15½	86	11.16	82	11.17	131	11.18	29	
132	3	138													26	
101	3 (w.)	139	65	12.00	49	12.02									35	Iron hot.
108	3 (w.)	139													33	Iron hot; slag filled up tuyeres after 20th ladle and bottom had to be dropped.
103	4	131													33	Temperature of iron medium.
124	4	131													27	Iron sluggish.
109	4 (w.)	136	96	11.03	80	11.03½	109	11.04							27	Iron very hot and fluid.
133	4 (w.)	136	52	11.29	103	11.32	40	11.33							32	
	Arkansas:															
96	1 B (w.)[a]	97	80	4.31	41	4.34									36	Iron hot.
115	1 B (w.)[a]	97													25	Iron hot. Bed burned out and charges hung; bottom had to be dropped after 15th ladle.
116	7 B (w.)[b]	105													33	Iron hot. Charges hung and bottom dropped after 11th ladle.
142	7 B (w.)[b]	105	58	11.34	40	11.36									35	Temperature of iron medium.
95	9 (w.)[a]	102													28	Iron cold and dull.
117	9 (w.)[a]	102													25	Iron hot and fluid.
	Illinois:															
125	22 B (w.)	118													34	Iron hot.
150	29 (w.)	170	88	11.41	92	11.43	67	11.44	20	11.45					34	Temperature of iron medium.
157	29 (w.)	170	109	3.52½	85	3.53	83	3.55	93	3.56					31	Iron hot.
164	29 (w.)	170													30	Iron cold.
	Indiana:															
121	12 (w.)	110	94	11.18	126	11.19									25	Iron dull.
148	17 (w.)	163													32	Temperature of iron medium.
	Kansas:															
122	6 (w.)	115													33	
	Kentucky:															
147	8	164													31	Temperature of iron medium.
155	8	164	66	4.23	64	4.23½	85	4.24	65	4.25	55	4.25½	25	4.26	38	Do.
156	8	164	85	11.36	100	11.36½	103	11.37	75	11.39					32	Do.
149	9 A (w.)	167	78	3.39½	97	3.40	97	3.41	67	3.43	85	3.45			28	Iron hot.
162	9 A (w.)	167	79	11.24	66	11.25	130	11.26	69	11.27					32	Temperature of iron medium.
163	9 A (w.)	167	88	4.26	98	4.27									42	Do.
	Missouri:															
123	5 (w.)	116	90	3.49	70	3.50	56	3.51	90	3.52	45	3.52½	69	3.53	34	Temperature of iron medium; 27th ladle—92 pounds at 3.54; 28th ladle—52 pounds at 3.54½; 29th ladle—39 pounds at 3.55.

	New Mexico:															
119	4 B (w.)	151	70	9.29½	101	9.31	82	9.32	65	9.32½	69	9.33	142	9.34	31	
120	5 (w.)	147													28	Iron hot and fluid.
98	3. 4 B (w.)	152													29	Iron very hot and fluid. Large quantities of slag closed up tuyeres after 16th ladle.
130	4 B (w.) 5.	152	86	3.53½	25	3.54	57	3.55							28	
	Pennsylvania:															
143	11	159													34	Iron hot.
161	11	159	83	2.33½	99	2.34	37	2.36							28	Iron cold.
145	12	161													41	Blast off 19 minutes; melting too fast to handle.
146	12 (w.)	162													34	Iron hot.
151	12	161	109	4.10	71	4.10½	108	4.11	109	4.11½	66	4.15			35	Iron hot.
152	12	161													33	Do.
153	12 (w.)	162	98	3.40	102	3.40½	103	3.41	89	3.43					36	Do.
154	12 (w.)	162	70	11.35½	88	11.36	17	11.37							31	Temperature of iron medium.
190	21	187	100	11.38	23	11.38½	87	11.39	17	11.39					25	Temperature of iron medium. Blast off 8 minutes.
	Tennessee:															
126	1	133													33	
99	1 (w.)	153	111	9.26	63	9.27	39	9.27½	100	9.28					34	Iron very hot.
128	1 (w.)	153													34	Blast off 1 minute.
100	2	127	82	1.55	49	1.55½	49	1.56	60	1.59	58	2.00			33	Iron very hot and fluid.
140	2	127	71	3.22	77	3.23	101	3.23½	57	3.24	63	3.26½	43	3.27	34	Temperature of iron medium.
104	3	128	38	9.44	74	9.44½	24	9.45	29	9.48	63	9.48½	27	9.49	35	Iron hot and fluid; 27th ladle—62 pounds at 9.51.
139	3	128													32	Iron hot.
102	4	125													32	Do.
105	4	129	127	3.03											31	Iron very hot and fluid.
138	4	129	26	4.32½	74	4.35	27	4.35½	49	4.40					40	Iron hot.
106	5 (w.)	154	74	9.46	105	9.46½	124	9.47	50	9.51					31	Iron very hot and fluid.
129	5 (w.)	154	90	10.23	75	10.24									34	
112	6	122														Blast on 30 minutes; no iron melted; coke very high in ash and dirty.
141	6	122													30	Iron cold.
113	7 B (w.)	123	83	4.07½	90	4.08	106	4.08½	84	4.09	96	4.09½	79	4.11	30	Blast off 3 minutes. Iron very hot and fluid.
137	7 B (w.)	123													34	Iron cold.
114	8 B (w.)	134	92	11.38½	74	11.39	83	11.39½	104	11.40	57	11.46½	67	11.47	36	Iron very hot; 27th ladle—104 pounds at 11.48.
135	8 B (w.)	134													27	Blast off 1 minute; tap hole cut out and iron run over trough. Iron hot.
110	9 (w.)	124	91	4.06	98	4.07									34	Iron very hot and fluid.
136	9 (w.)	124	92	4.11½	108	4.13	57	4.13½	65	4.14					26	
111	10 (w.)	156														Blast on 30 minutes; no iron melted.
127	10 (w.)	156														Coke bed put in and blast put on for 20 minutes; coke would not ignite; bottom dropped without changing iron.
144	11 (w.)	160														Blast on 32 minutes; no iron melted.
179	11 (w.)	160													20	Iron cold and sluggish.
	Utah:															
118	1	130														Blast on 20 minutes; no iron melted; bed burned out.
	Washington:															
197	2	135													29	Iron cold.
134	2	135	88	5.04											30	

a Plus 10 per cent pitch.

b Plus 5 per cent pitch.

Chemical effect on iron in cupola tests of coke from coals received from January 1, 1905, to June 30, 1907.

Cupola test No.	Designation of coke.		Chemical effect on the iron in melting (per cent).										Analysis of coke on page—
			Silicon.			Manganese.			Sulphur.				
	Field No. of coal.	Coke test No.	In pig iron.	In melted iron.	Lost by oxidation.	In pig iron.	In melted iron.	Lost by oxidation.	In pig iron.	In melted iron.	Increase.	Total in coke taken up by iron.	
1	2	3	102	103	104	105	106	107	108	109	110	111	112
	Illinois:												
150	29 (w.)	170	2.12	1.91	9.90	0.178	0.155	12.93	0.059	0.086	0.027	6.59	29
157	29 (w.)	170	2.12	1.84	13.21	.178	.133	25.29	.059	.108	.049	11.69	29
164	29 (w.)	170	2.10	1.68	20.00	.163	.111	31.90	.098	.133	.035	6.74	29
	Indiana:												
187	5	8	2.10	1.66	20.96	.163	.115	29.44	.098	.165	.067	6.13	29
173	9	17	2.10	1.58	28.16	.163	.112	31.30	.098	.148	.050	4.51	29
174	9	17	2.10	1.71	18.58	.163	.124	23.93	.098	.156	.058	7.22	29
148	17 (w.)	163	2.12	1.75	17.47	.178	.126	29.20	.059	.108	.049	6.88	29
	Kentucky:												
47	7	85	1.74	1.39	20.11	.178	.133	25.28	.051	.085	.034	7.56	30
156	8	164	2.12	1.82	14.15	.178	.111	37.64	.059	.083	.024	19.95	30
147	8	164	2.12	1.80	15.12	.178	.096	46.06	.059	.067	.008	4.65	30
155	8	164	2.12	1.72	18.85	.178	.123	30.90	.059	.079	.020	12.37	30
162	9 A (w.)	167	2.10	1.76	16.19	.163	.120	26.39	.098	.118	.020	7.73	30
149	9 A (w.)	167	2.12	1.83	13.68	.178	.133	25.29	.059	.079	.020	6.69	30
163	9 A (w.)	167	2.10	1.73	17.61	.163	.096	41.09	.098	.135	.037	8.29	30
	Ohio:												
165	9	72	2.10	1.78	15.24	.163	.110	34.33	.098	.143	.045	8.16	31
166	9	72	2.10	1.74	19.06	.163	.111	31.89	.098	.151	.053	9.17	31
	Pennsylvania:												
143	11	159	2.12	1.85	12.74	.178	.111	37.66	.059	.070	.011	4.83	32
161	11	159	2.10	1.74	17.15	.163	.113	30.68	.098	.113	.015	7.57	32
152	12	161	2.12	1.86	12.28	.178	.130	26.97	.059	.070	.011	4.92	32
145	12	161	2.12	1.89	10.85	.178	.133	25.28	.059	.069	.010	4.35	32
151	12	161	2.12	1.91	9.90	.178	.123	30.90	.059	.078	.019	5.94	32
154	12 (w.)	162	2.12	1.81	14.62	.178	.136	23.59	.059	.074	.016	11.13	32
146	12 (w.)	162	2.12	1.84	13.21	.178	.141	20.78	.059	.080	.021	11.20	32
153	12 (w.)	162	2.12	1.78	16.05	.178	.128	28.09	.059	.088	.029	15.27	32
	Virginia:												
158	2	69	2.12	1.77	16.52	.178	.144	19.09	.059	.074	.015	17.10	34
171	2 (w.)	70	2.10	1.69	19.52	.163	.107	34.35	.098	.116	.018	25.01	34
172	2 (w.)	70	2.10	1.76	17.61	.163	.124	23.92	.098	.111	.013	12.49	34
52	2 B	69	1.89	1.55	17.77	.163	.133	18.42	.048	.042	......	None.	34
	West Virginia:												
159	4 (w.)	44	2.12	1.94	8.50	.178	.126	29.22	.059	.077	.018	9.41	34
53	4 B (w.)	44	1.89	1.54	18.53	.163	.126	22.70	.048	.042	......	None.	34
160	4 (w.)	44	2.12	1.90	10.38	.178	.126	29.21	.059	.085	.026	19.99	34
167	15	36	2.10	1.65	21.42	.163	.111	35.54	.098	.137	.039	9.92	34
51	15	36	1.89	1.45	23.27	.163	.104	36.18	.048	.047	......	None.	34
168	15	36	2.10	1.71	18.57	.163	.104	36.19	.098	.146	.048	12.79	34
49	15	43	1.74	1.35	22.41	.178	.111	37.63	.051	.060	.009	2.35	34
169	16	45	2.10	1.68	20.00	.163	.106	34.96	.098	.138	.040	16.33	34
170	16	45	2.10	1.67	20.47	.163	.111	31.90	.098	.126	.028	12.94	34
50	16 B	45	1.74	1.26	27.57	.178	.111	37.64	.051	.052	.001	.26	35

O